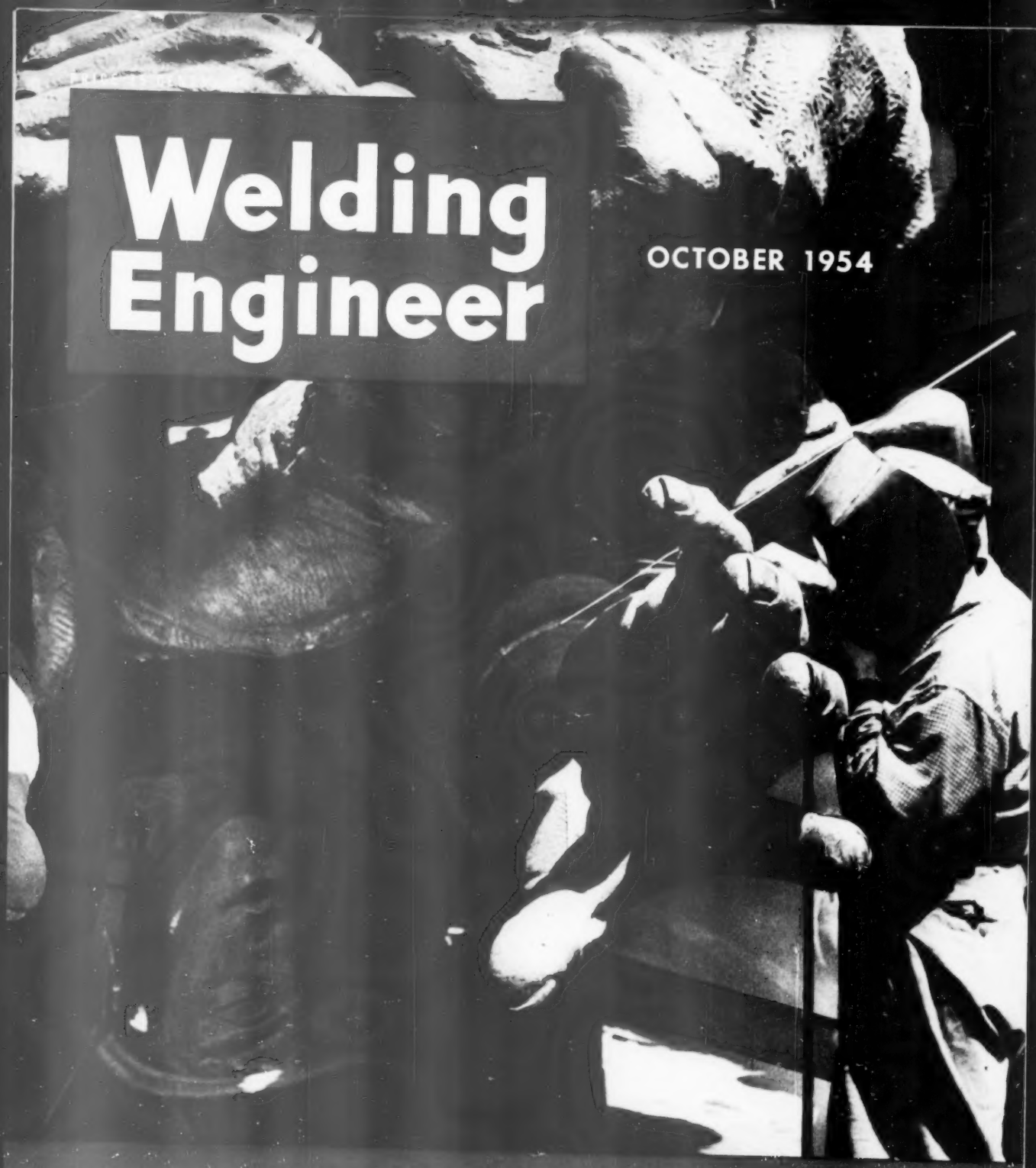
# Welding Engineer

OCTOBER 1954



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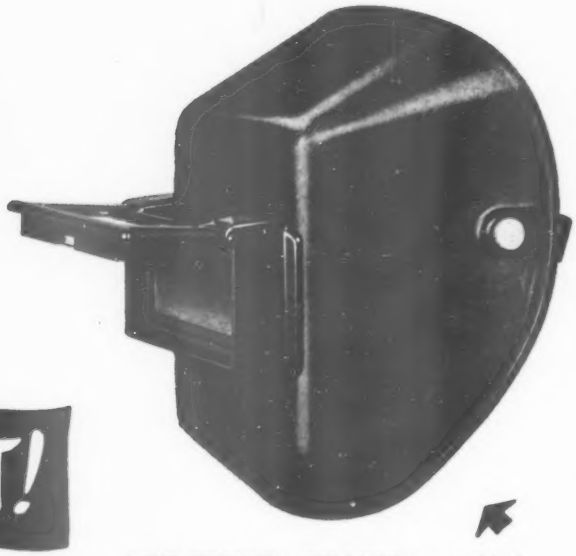
**FIXED-FRONT HELMET type H-3**
**has light metal lens holder. Cover glass is replaced from the front by sliding it out without disturbing other parts.**



# Another Jackson FIRST!

***Two Helmets in Popular Narrow-Front Style Now Made in Modern Fiber-Glass Plastic***

**LIFT-FRONT HELMET type H-4**
**permits work inspection without raising the entire helmet. The lens holder is of high-impact thermosetting plastic with hinged door held up or down by coil springs. Filter lens is protected by a cover glass, and a second clear glass stays in place when front is up to protect the eyes from flying particles.**

For the first time, Jackson offers two welding helmets in the popular shape favored by many weldors to make work easier in the tight spots. Type H-3, with fixed front, and H-4, with lift front are otherwise similar to the other Jackson Helmets, but somewhat lighter in weight.

Helmets H-1 and H-2 have long since proved the economy of long-lived fiber-glass over vulcanized fiber. More resistant to heat and moisture, they hold their shape, withstand weld spatter and high voltage, are strong, smooth, easy to clean, and attractive in appearance.

Headgears are of smooth plastic, easy to clean, with inexpensive, snap-on, cork-padded sweatband. Calibrated to hat sizes in ⅛-inch steps, they are quickly fitted. Friction pivots are adjustable by hand while helmet is worn. Helmets can thus be made to float down without jolts, and stay in any desired position.

**type H-2**

**type H-1**

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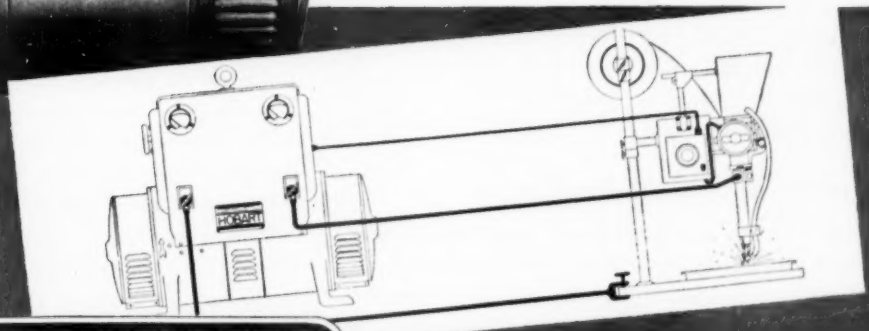


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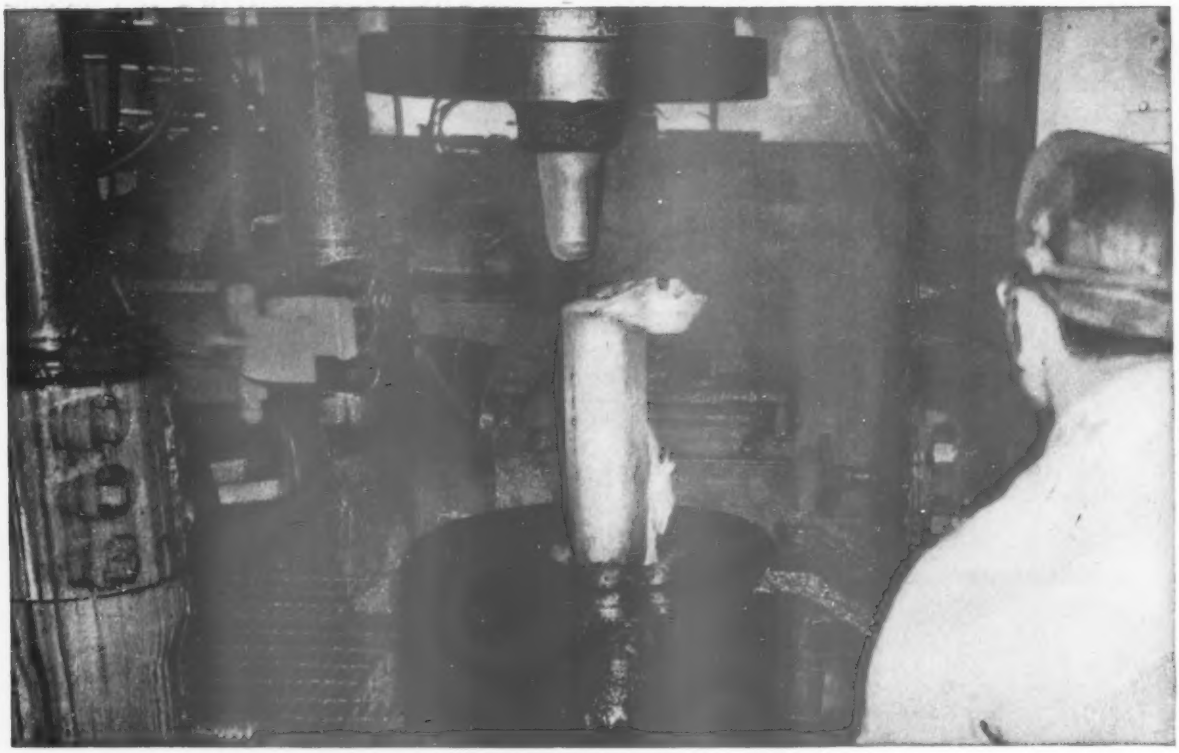

# Die Pot Life Increased 350 Per Cent

A deposit of HASTELLOY alloy C hard-facing rod has more than tripled the service life of the die pots used in this slugging and piercing operation. The hard-faced parts are exposed to severe impact and abrasion at high temperatures. Press tonnages required to perform the operation have been reduced from 30 to 50 per cent since the pots have been faced with HASTELLOY alloy C. This rather unusual plus value is due to the low friction characteristics of this nickel-base alloy.

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For information on procedures for applying and for available sizes and prices, write for the booklet "HASTELLOY Alloy C—A Machinable Hard-Facing Alloy."

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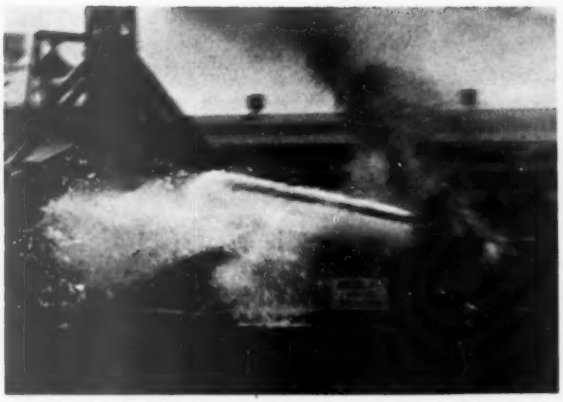
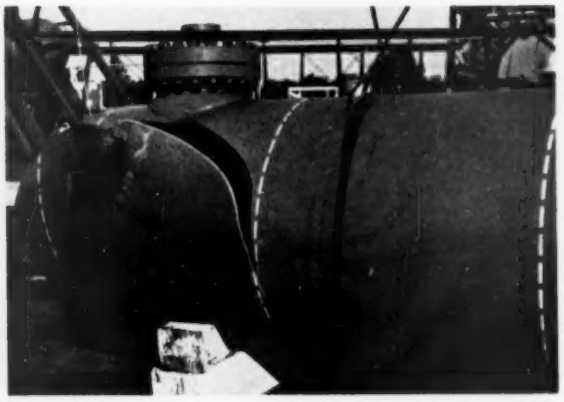


VESSEL made of new alloy steel bursts under 2,850 psi internal pressure . . .



RUPTURE in tank occurred adjacent to or across the welds. Toughness is indicated by shear break, lack of shatter

# NEWS

## U. S. Steel tests newly-developed alloy

COATED with ice at 45 deg below zero, two large closed pressure tanks of a new kind of steel were recently put through burst and impact tests in Birmingham, Ala. The vessels were made of a new quenched and tempered steel known as "Carilloy T-1," a product of United States Steel Corp.'s research laboratory.

The tests were staged in an open area adjoining the plant of Chicago Bridge and Iron Co. Engineers and research experts of both companies took part in the series of tests before an audience of government and technical code authorities, representatives of the Atomic Energy Commission, Army and Navy officers, as well as the heads of military and civilian aeronautical groups.

The tanks were cooled by pumping into them hundreds of gallons of calcium-chloride brine chilled by dry ice. The separate test methods — burst tests and drop impact tests—were used to demonstrate the strength and toughness of the steel, said Leon C. Bibber, welding research engineer who headed U. S. Steel's special test force.

The burst test was made to determine how much internal pressure the tank could withstand before it burst. In the drop test a new method of testing full-scale vessels was used. A 26,700-lb steel weight was dropped upon the tank from heights of 52, 73 and 101 ft to show the steel's toughness at low temperatures. Internal pressure in the drop test was 1,875 psi.

The two tanks tested were identical —20 ft long, including their hemispherical ends, and 40 in. in diameter, made from steel plates ½-in. thick, crusted with ice from forced refrigeration. They were in the natural condition, as welded. Similar tests were performed on two similar tanks that had been stress relieved.

In tests on non-stress relieved vessels, 2,850 psi internal pressure was applied in the burst test before the steel gave way. Not until the 13-ton steel weight was dropped vertically from 101 ft did a similar tank, also under internal pressure, give way in the drop test.

* * *

## UCC combines Oxweld with Linde Air Products Co.

UNION Carbide and Carbon Corp., New York City, has combined its Oxweld Railroad Service Co. with Linde Air Products Co., another UCC division. Linde has formed a new Railroad Department to conduct the business formerly handled by Oxweld, and K. I. Thompson, formerly vice-president in charge of sales for the Service Co., has been named its manager, with headquarters in New York City.

G. P. Bogert, president, and M. Burnett, Jr., vice-president of Oxweld, will continue in those capacities to assist in the reorganization. The former organization of personnel of the Service unit continues as the new Railroad Department.

## NCG moves into new building in San Leandro, Calif.

NATIONAL Cylinder Gas Co., Chicago, recently moved its Northern California district office and warehouse into a new building at 1588 Doolittle Dr., San Leandro, Calif. Constructed on a 7½-acre site, the building is the first unit in a projected plant-expansion program for the area.

Work has already begun on a second unit of the program, which will consist of an acetylene plant to be located on the same site. It is scheduled to be completed toward the end of this month.


**A family affair**

**Mother and Father, Brother and Sister . . . everybody benefits when everybody gives the united way.**

THE UNITED WAY

**United Community Campaigns all over the nation appeal to you this month. Give generously to your town's united campaign for voluntary health, recreation, family welfare and defense related services.**

LONG welded gas pipeline is being laid in Australia

ROTARY air tools demonstrated at dedication ceremony

### Welded gas pipeline laid in long sections

CONSTRUCTION of an 18-in. all-welded gas pipeline is Australia's first fling at long-distance conveyance of gas. It will carry cooking gas from the Norwell, Victoria, lignite gasification plant to Melbourne, a distance of 90 miles. The line will operate under a pressure of 400 psi.

It is being laid down in long sections lowered from tractor-mounted booms. A section 1,340 ft long consists of 44 factory-welded sections joined together in the field by butt welding. When the pipeline reaches open country, it is hoped to lay lengths of half a mile at once.

A novel technique involving an inside and outside run is employed in the welding of longitudinal seams in the factory. Testing in the field for flaws and leaks, too, relies on a new technique—and it isn't radioactive cobalt 60 radiograms, though these are used also. Technicians of the Gas & Fuel Corp., of Victoria, have hit on a more simple idea. They have designed a curved rubber seal, which looks like a diver's mask, that is placed on the weld seams. The area covered by the mask is moistened with soap water. This insures a tight seal when the air is pumped out of the mask.

The weld is observed through a window similar to one in the diver's mask. If there is an air leak in the pipe, air is sucked into the evacuated seal, stirring up a fine lather as it passes through the layer of soap-water. —*McGraw-Hill World News*

### Here's how to get from hotel to Metal Show

THOSE of you who will attend the annual meeting of the American Welding Society in Chicago next month can get to the International Amphitheatre—site of the Metal Show—via three ways if you don't care to take a taxi. A bus service will be maintained between AWS headquarters (the Sherman Hotel at Clark and Randolph Sts. in the Loop) and the show site at 42nd and Halsted Sts.

Chicago's transit system offers two other means: you can catch a Halsted bus, which runs on Clark St. in the Loop, right outside the hotel. It stops at the Amphitheatre's door. By walking two blocks east from the hotel to State St., you can get a southbound subway. Take it to Indiana Ave., where you transfer to a Stock Yard's local elevated train, which stops within a block of the hall.

* * *

### Whitehead clinic in new warehouse addition

TWENTY live exhibits will feature a clinic to be held Oct. 13-15 by Whitehead Metal Products Co. in its new 25,000 - sq - ft warehouse recently opened at 281 Albany St., Cambridge, Mass.

* * *

### North Carolina supply house has new name

LEE and Audrey Hurst are now operating the Hurst Annaho Supply Co., Fayetteville, N. C., formerly known as Melton Welding Supply. Tony Melton is now manager of the Farmville, N. C., branch of the company.

### Buckeye Tools Corp. dedicates new plant

AN estimated 2,000 persons attended dedication ceremonies of the new Buckeye Tools Corp. plant in Dayton, O. The new plant and offices occupy 25,000 sq ft of floor space in a modern single-story structure. An open house was held on the day following the official dedication.

Buckeye manufactures rotary air tools.

* * *

### G-E develops new X-ray microscope

AN X-ray microscope that "looks inside" magnified specimens has been developed by General Electric Co. Capable of magnifying up to 1,500 diameters, the instrument is said to have wide application in industry, including its use in study of welds.

In the G-E microscope, the X-ray source is only 1/100,000ths of an inch—300 times smaller than the diameter of a human hair. The electrons are focussed through two electrostatic lenses, which are essentially doughnut-shaped metal rings to which voltage is applied. The magnified X-ray image thus obtained can be seen by the eye or photographed for permanent record.

The instrument is not affected by magnetic materials, and therefore can be used in the study of steel and alloys. Wave length of X-rays can be changed without changing focus, making it possible to vary contrast of pictures.

Sterling P. Newberry, electron-optics engineer of the G-E general engineering laboratory, Schenectady, N. Y., described the device at a six-

*(Continued on page 92)*

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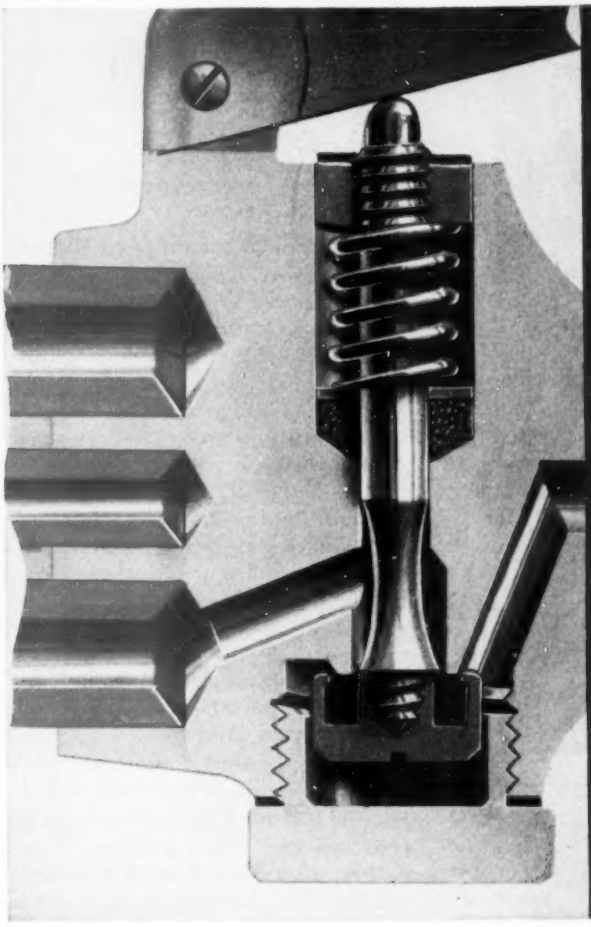

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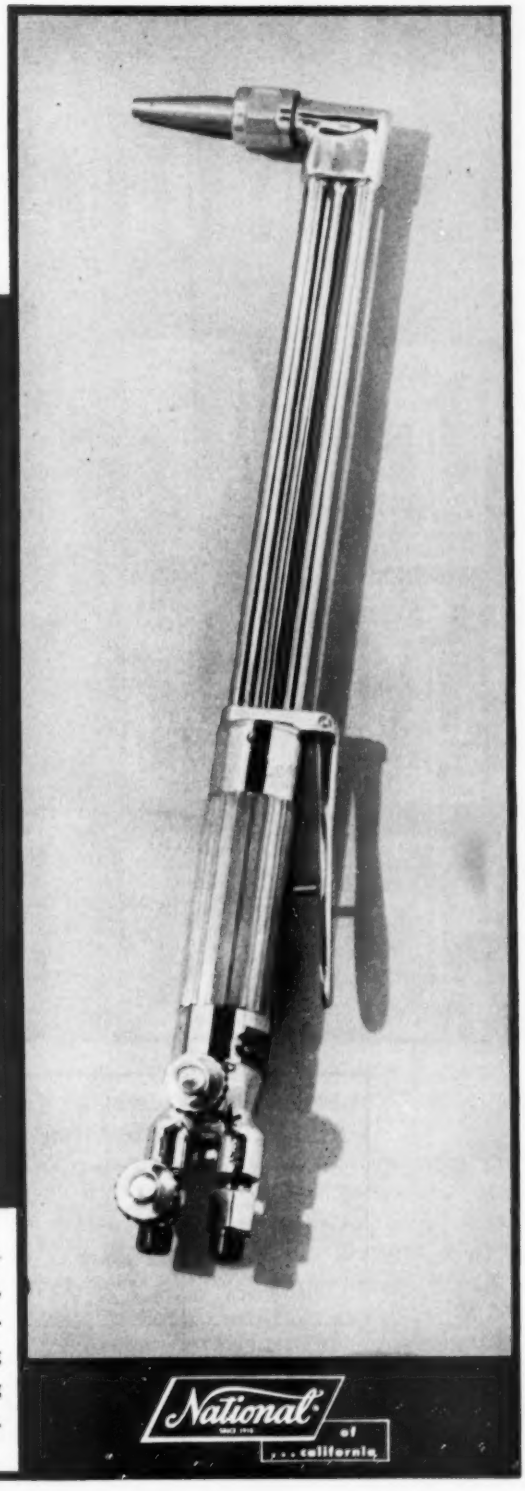


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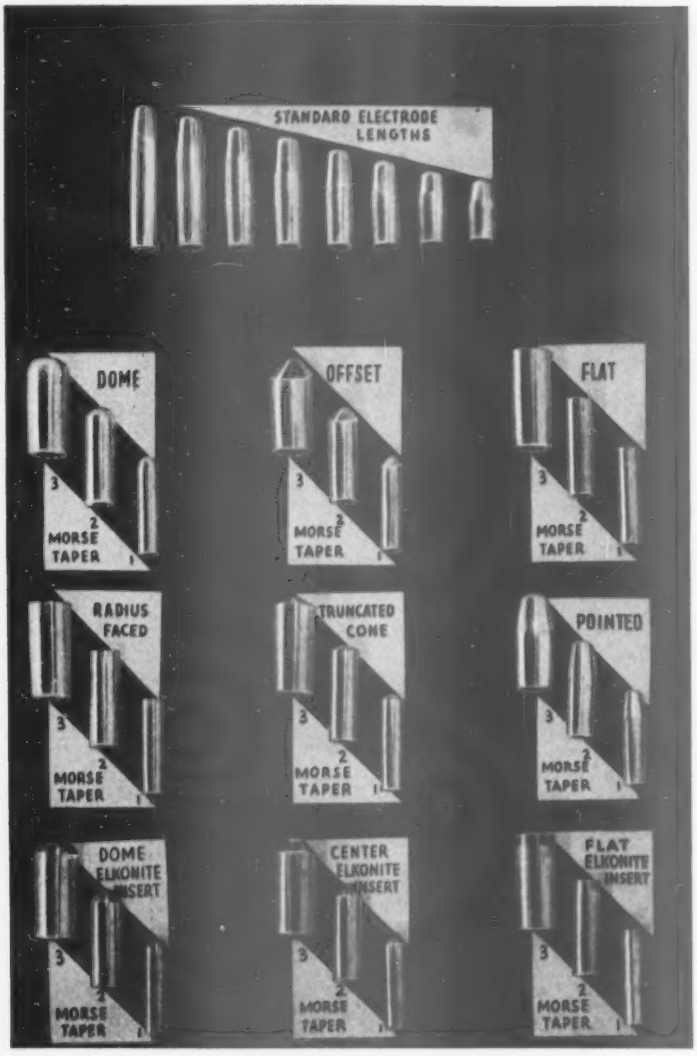


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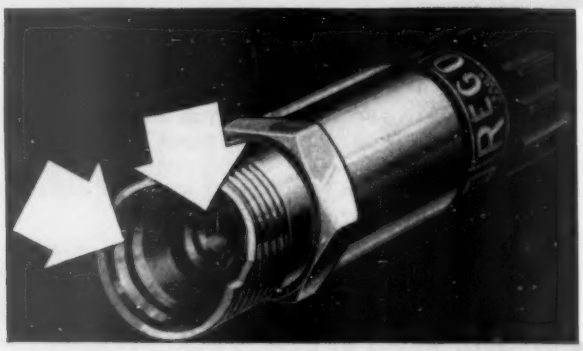

**THIS CUT-AWAY** shows seating rings (arrows) in conical seating surfaces of the REGO "GX" head. Made of extra tough, long-wearing Neoprene, they assure a perfect gas-tight coupling of tip, mixer and head . . . are easily and quickly replaceable when necessary.

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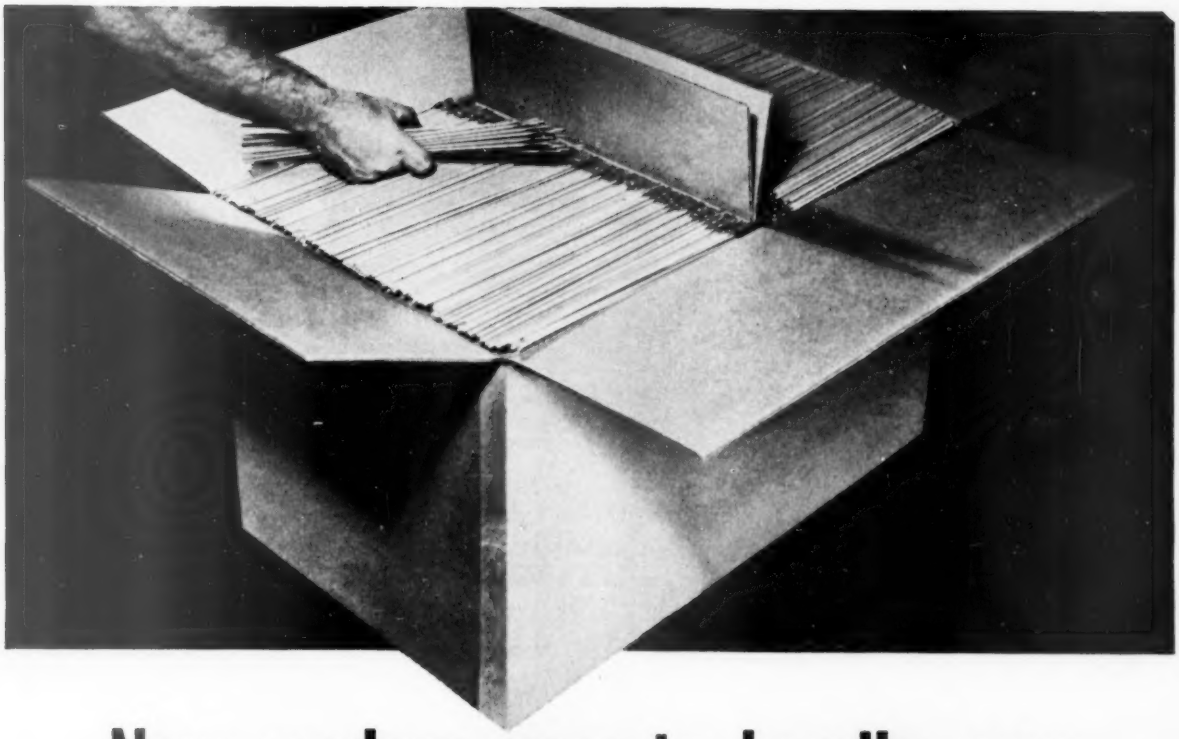


# New modern way to handle your A. O. Smith electrodes

## *Production-Pak containers work for you 'til the last rod is used*

If you use electrodes in *quantity*, this is for you! A. O. Smith's new Production-Pak containers start paying off the moment they hit your plant.

● **HANDLING EASE.** A single Production-Pak contains approximately 2,000 lbs. of electrodes . . . as many electrodes as you'd get in 40 ordinary boxes. Think of the time and labor saved in unloading alone. Think of the freedom from costly palletizing and de-palletizing.

● **STOREKEEPING CONVENIENCE.** Production-Pak is its own storage bin. Electrode distribution is faster, easier. No need to break open individual smaller boxes. Just pass out the rods by the handful.

● **INVENTORY SIMPLIFIED.** Fewer boxes to count. Inventories stay better-balanced . . . because electrodes are easier to dispense on a first-in, first-out basis.

Ask your A. O. Smith distributor about Production-Pak today . . . or write A. O. Smith Corporation, Welding Products Division, Milwaukee 1, Wisconsin.

*Through research* ...*a better way*

**A.O.Smith**
CORPORATION

WELDING PRODUCTS DIVISION
Milwaukee 1, Wisconsin
INTERNATIONAL DIVISION: MILWAUKEE 1

# Welding Goggles

Travel the country from coast to coast and you'll see AO's 404A goggle worn by welders in the welding departments of the largest plants . . . and in the smallest shops . . . on new work and maintenance. It's research-born and engineered to protect against dangerous light rays, glare, flying sparks, and scale on acetylene welding, cutting, burning, brazing, furnace operations . . . with maximum comfort and certainty.

## AO 404A
## DURAWELD GOGGLE

### Quick Facts

SIDE SHIELDS — Specially designed to bar undesirable light rays, sparks and metal splashes, yet provide indirect ventilation to reduce fogging.

EYECUPS — Individual, fit contour of each eye, snugly against face. Low set for wide angle vision. Won't conduct heat or electricity.

BRIDGE — Ball-chain type insulated with tubing, curved slightly for comfortable fit. Quick adjustment.

HEADBAND — One-piece rubber, easily adjusted.

LENSES — 50 mm. Noviweld or Filterweld shades 3, 4, 5, 6 . . . or Noviweld-Didymium for absorbing yellow sodium flare in shades 3, 4, 5, 6 . . . or Pink Didymium 6.00 Curve, 50 mm. round Super Armorplate. Noviweld and Noviweld-Didymium lenses are protected from pitting by easily replaceable cover lenses. Specify type of lens and shade number.

RUBBER CUSHIONS — These are available around facial portion of goggles at a slight extra cost.

Research and Engineering Give

# AO WELDING GOGGLES

Leadership in Eye Protection

The result of careful investigation, and painstaking engineering, this goggle is used by many gas welders, burners, cutters, brazers and furnace men for wear over their personal and prescription safety glasses. They prefer its light weight and its sure protection against injurious light radiations, flying sparks, glare and scale. Be sure to ask about this *double* protector. We call it the 327A Duraweld Coverglas goggle.

## AO 327A
## DURAWELD COVERGLAS GOGGLE

### Quick Facts

SIDE SHIELDS — Light-tight for welders, provide indirect ventilation.

LENSES — Shape of 57.8 mm. lenses permits a wide field of vision up to 20% greater than other goggles of this type.

HEADBAND — New, all rubber, easily adjustable by pulling headband through slots at end of eyecups.

EYECUPS — Opaque, specially designed to fit over practically all types of personal and safety glasses.

BRIDGE — High grade leather. Instant adjustment.

*Note:* Goggle can be supplied with *rigid bar bridge* as No. 327B; with *adjustable* rigid metal bridge as No. 327R. Specify the style of bridge you prefer.

American Optical

SAFETY PRODUCTS DIVISION

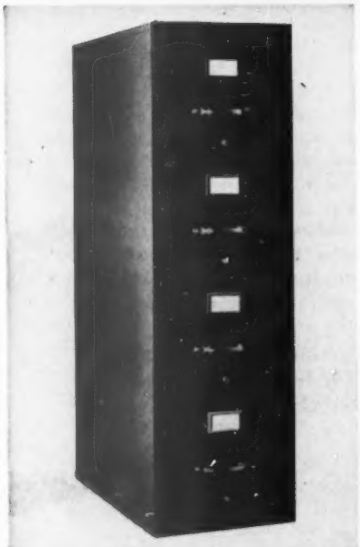
AO SAFETY ZONE

Keep your workers in the Safety Zone with American Optical Safety Equipment

Your nearest AO Safety Products Representative can supply you

SOUTHBRIDGE, MASSACHUSETTS • BRANCHES IN PRINCIPAL CITIES

**STRONG JOINT** on desk housing is made with Tobin Bronze Welding Rod.



**COLUMBIA** Steel Office Equipment Co. also produces attractive filing cabinets like this one by braze-welding with Tobin Bronze Welding Rod.

# Office equipment maker uses Tobin Bronze to braze-weld stronger, cleaner joints

On desks and filing cabinets it's important that all corner joints have adequate rigidity and strength, and that they look clean and neat after enamel finishing. Whether they will or not depends largely on the welds at these points.

Columbia Steel Office Equipment Co., Philadelphia, has this problem licked. First, they spot-weld all desks and filing cabinets. Then, units are braze-welded with Tobin Bronze* Welding Rods (3/32 in.). Columbia says, "Braze-welding with Tobin Bronze provides greater strength at the joints . . . helps to make our equipment more attractive. Our work goes faster, too. Tobin Bronze flows freely, 'tins' quickly, gives strong, neat bonds. Braze-welding with Tobin Bronze is the fastest, most economical way we've found to do the job."

**ANACONDA** Welding Rods for many types of production and repair jobs are available from distributors throughout the United States. *The American Brass Company, Waterbury 20, Conn.* In Canada: *Anaconda American Brass Ltd., New Toronto, Ont.*

*Reg. U. S. Pat. Off.

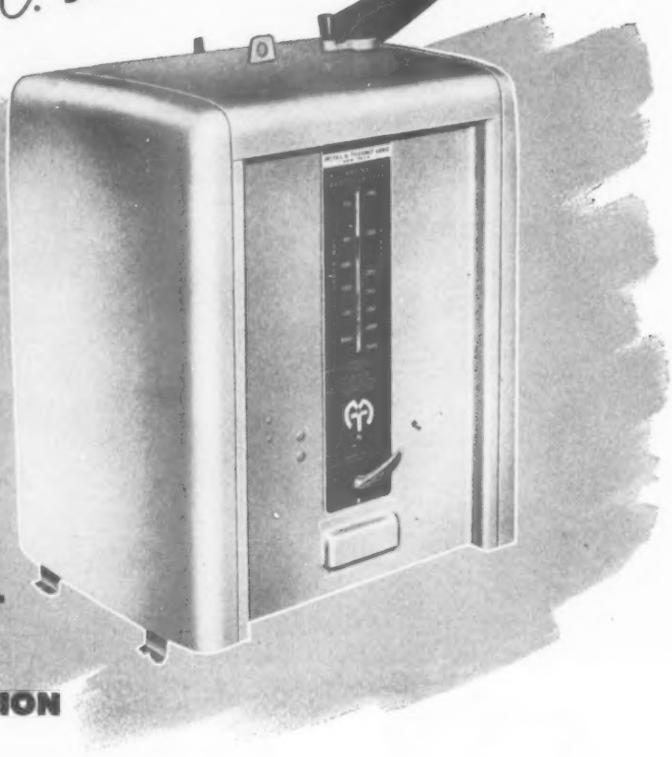
ANACONDA®

**Welding Rods**

*Anaconda Copper-372 • Tobin Bronze-481 • Anaconda-997 (Low Fuming) Bronze • Nickel Silver-828 • Cupro Nickel-826 • Everdur-1010 • Ambraloy-928 • Phosphor Bronze-351 • Phosphor Bronze-354.*

For faster work at less cost—

# M & T's New D.C. Rectifier Welder



**INSTANT ARC**

**STABLE ARC**

**STEPLESS CURRENT CONTROL**

**SILICONE INSULATION**

## LESS WORKER FATIGUE

Your production is bound to increase when M & T's new DC Rectifier is on the job! Stable arc and instant reaction to changes in arc conditions mean stronger welds, fewer "patch-ups." There's no inductive time lag, either. Stepless current control, wide current range and absence of machine noise make for greater operator satisfaction and efficiency.

Maintenance is no problem whatever . . . Rectifiers and transformers are aircleaned by a reversible fan. There are no moving parts to wear out—the case can be removed for inspection easily, without disturbing primary lead. *Silicone insulation* protects against high temperatures, moisture, fumes and chemicals.

This 400 amp selenium rectifier is a standout in M & T's complete line of Welding Machines, Murex Electrodes and M & T Accessories. Write today for full information, or advice on any welding problem.

**METAL & THERMIT CORPORATION** 100 East 42nd Street, New York 17, N. Y.

MUREX ELECTRODES • ARC WELDERS • ACCESSORIES

# MAKE YOUR MOVE TO *Extra Savings*

## ON ALL WELDING AND CUTTING JOBS

by using

# BURDOX

**one source with everything to do your job better...faster...at lower cost!**

Stay a *jump* ahead of production costs—cut down on profit-consuming time, labor and material expenses by using the correct equipment for your welding and cutting jobs. Because BURDOX' experts are familiar with all of the different methods of doing these jobs, they know and can recommend the one that will do your work better...faster and at lower cost. Moreover, BURDOX can supply the correct accessories for each process and the proper safety equipment to safeguard the worker. BURDOX products cost no more than others—yet, because you can get *all* your needs from this one source, you effect added savings in many different ways. Why not make a comparison—call BURDOX on any welding or cutting requirement! Catalog available on request.

**BURDOX**

**EVERY PRODUCT and EVERY PROCESS TO FIT EVERY PURPOSE BEST...**

- industrial gases
- gas welding and cutting equipment
- arc welding equipment
- safety equipment

For Intermittent Service
You Can't Beat this Welder

You Can't Beat its Price

You Can't Beat its Performance

# New P&H TI-295 295-amp AC Welder

**America's most complete line of arc-welding equipment and electrodes**

P&H AC WELDER

A full range of sizes up to 625 amps (NEMA-rated). All are connectable to 220 or 440 volts. Dial-lectric Instantaneous Remote Control is fingertip control — gives you any heat you want, right at the work.

P&H DC RECTIFIER WELDER

Four sizes — 200, 300, 400 and 500 amps (NEMA-rated). No moving coils to break down — no bearings, brushes, commutator, brush riggings, etc., to replace. Dial-lectric Control gives you fingertip heat-control at the work.

P&H POSITIONERS

One finger is enough to position heavy weldments for economical downhand welding. Capacities from 2500 to 36,000 lbs. — remote-control and hand-operated models.

P&H ELECTRODES

A type and size for every job — to give you cleaner, sounder welds at lower cost on mild steel, cast iron, "hard-to-weld" steels, stainless steels, or hard surfacing.

## . . . the only low-cost intermittent-type welder that can handle low-hydrogen and stainless-steel electrodes

Here's another P&H first—a low cost, welder with all the advantages of a heavy-duty machine — with a rated load and duty cycle as follows: 295 amps 20%; 250 amps 30%; 200 amps 50%.

**Wide Range** — Just take a look at the current range of this new TI-295. You can't beat it, because you go from 25 amps to 295 amps. That means that you can use this machine on light-gauge material as well as on heavy plate.

**No Arc Booster** — You get much more than wide current range from this new welder — you get an open-circuit voltage of 75 volts. What does this mean to you? Just this — you can weld with low-hydrogen or stainless-steel electrodes. No other welder that sells for the low price of the TI-295 can do this — can give you such outstanding performance. Moreover, arc striking is made easier and electrode sticking is eliminated.

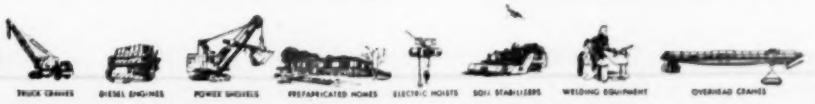
**Exclusive P&H Dial-lectric Control** — It's no wonder that you get sound, uniform welds with this machine. All you have to do is turn a radio-like knob with your fingertips and you get exactly the heat you need. The amperage adjustment is creep-proof too, so that when you set the heat it stays there. And changing heat is only a matter of a second or two because a three-quarter turn of the knob is all that's required to go from minimum to maximum capacity.

There is no hard-to-work crank to turn. There are no moving parts — no moving coils or cores, no worm gears or sprockets, chain or lever adjustments. This means there's less wear, less maintenance, *less noise* — nothing to bind or "freeze" from rust.

As we have said before, you can't beat this welder for performance at this price. It's your best welder buy. Contact your P&H representative or distributor — see for yourself how easily the new P&H TI-295 outperforms other welders in this class.

P&H WELDING DIVISION
**HARNISCHFEGER CORPORATION**
4513 W. National Ave. • Milwaukee 46, Wis.

*the* P&H *Line*




*P&H Welding equipment is manufactured and sold in Canada by*
REGENT EQUIPMENT MANUFACTURING COMPANY LTD.
455 King Street West • Toronto, Ontario, Canada

# WELDING IS EASIER WITH HELIARC Trade Mark TORCHES

## WELD ALL THESE METALS WITHOUT FLUX

- aluminum
- magnesium alloys
- stainless steel
- HASTELLOY alloys
- Everdur alloys
- cast iron
- MULTIMET alloys
- brass and bronze
- copper
- Inconel alloy
- mild and low-alloy steel
- silicon-copper alloys
- nickel and nickel-base alloys
- silver and silver-cladding

**HIGHEST WELD QUALITY**

**GREATEST WELDING SPEED**

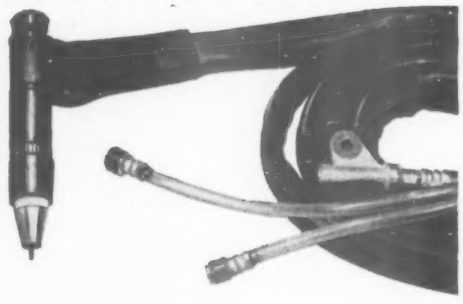
**MINIMUM WELD FINISHING**

**HW-9**
**for light welding**
Air-cooled—
75 amp. a.c.h.f., d.c.s.p.
Electrode sizes:
.020 to 1/16 in.

**HW-10**
**for general welding**
Water-cooled—
300 amp. a.c.h.f.,
d.c.s.p., d.c.r.p.
Electrode sizes:
.040 to 1/8 in.

**HW-12**
**for heavy-duty welding**
Water-cooled—
500 amp. a.c.h.f.,
d.c.s.p., d.c.r.p.
Electrode sizes:
.040 to 1/4 in.

**HW-8**
**for spot-welding**
Water-cooled—
250 amp. a.c.h.f., d.c.s.p.
Electrode sizes:
1/8 to 5/32 in.



**HW-13**
**for mechanized welding**
Water-cooled—
500 amp. a.c.h.f., d.c.s.p.
Electrode sizes:
.040 to 1/4 in.

**Linde Air Products Company**
**A Division of Union Carbide and Carbon Corporation**
30 East 42nd Street UCC New York 17, N. Y.
Offices in Other Principal Cities
In Canada: DOMINION OXYGEN COMPANY
Division of Union Carbide Canada Limited, Toronto

*"Hastelloy," "Heliarc," "Linde," and "Multimet" are registered trade-marks of Union Carbide and Carbon Corporation.*

Linde Trade-Mark

# This NEW resin sander disc is so sharp you can see

## and feel the difference!

You never saw a sander disc that *looks* so sharp... *feels* so sharp... *cuts* so fast, free and cool. It's the all-new Resin Sander Disc by CARBORUNDUM.

Test it on the toughest sanding job in your shop. See how it beats any other disc — for cutting ability, long life, uniformity. Notice how the edge holds its shape longer, and how the abrasive grain stands up under the most severe grinding conditions. And you'll find it *stays* uniformly sharp, from start to finish.

**WHAT'S NEW IN THESE DISCS? EVERYTHING:**

The abrasive grain is an improved type; the resin bond is engineered to provide more holding power; a new and tougher fiber is used in the backing. And rigid new manufacturing controls assure highest uniformity from disc to disc, from order to order...to give you truly dependable performance.

Sander Discs by CARBORUNDUM come to you in moisture-resistant boxes to keep them "factory-fresh" and to make handling and storage easier.

**FOR A FREE DEMONSTRATION...call your CARBORUNDUM Distributor or Salesman, listed in the yellow pages under "Abrasives" or "Grinding Wheels." Or write The Carborundum Company, Dept. WE 82-417, Niagara Falls, New York.**

# CARBORUNDUM

REGISTERED TRADE MARK

...continually putting more KNOW-HOW in your abrasive GRAIN

82-417

WELDING ARCS NEWS

# LONG-LIFE WELDERS ASSURED BY MODERN TESTING AT NEW G-E PLANT

**NEW, EXPANDED G-E PLANT** at York, Pa., devotes modern manufacturing-testing-facilities to new standards in arc-welding equipment. New G-E a-c welders undergo extensive quality controls . . .

**PERFORMANCE TESTING** of new a-c welder backs up long-life span. Every phase of operation is checked before the welder is released for production.

# G.E. announces a NEW line of long-life a-c transformer welders

***life-span increased with new design and materials—backed up by exacting quality controls, including 20 life-tests, 21 inspections***

From its new, expanded manufacturing plant at York, Pa., General Electric now brings you industry's most modern line of a-c transformer welders. Available in 300-, 400-, and 500-amp models for indoor and outdoor service—this new equipment features improved design, new materials, and will give long, dependable service.

**MOVING-COIL DESIGN REDUCES WEAR** and vibration normal to other types of welder design. No moving magnetic parts are used. This low-maintenance design also furnishes accurate pinpointing of current settings for real welding precision.

**IMPROVED AUTOMATIC "HOT-START"** gives you the advantage of instant arc striking throughout the current range. Now you can be sure of quick starts even at the low end of the range.

**PROTECTION AGAINST OVERHEATING DAMAGE** caused by short-time overloads is provided by silicone insulation on aluminum-wound coils. This insulator stands up against overload temperatures which disintegrate ordinary varnishes.

**NEW ALUMINUM WINDINGS** are used on transformer coils for reliable service, even under highly critical conditions.

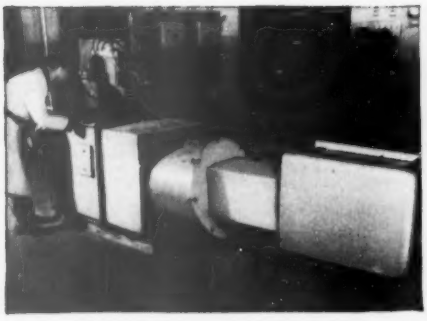
**REMOVABLE SIDE COVERS, OPEN CONSTRUCTION** speed servicing. Each side cover of the G-E a-c welder can be removed quickly by simply taking out three screws.

**EVEN QUIETER OPERATION** than normal for a-c welders is achieved by a special vibration-insulating mount for coil supports. The moving primary coil virtually "floats," with a minimum of friction, vibration, and fatiguing noise.

**IMPROVING ON EASY-TO-HANDLE ARC** inherent to a-c equipment, the new G-E transformer welder provides arc stabilizing capacitors. The result is an unusually steady arc, which can be manipulated easily for faster travel speeds and increased production.

**ASK YOUR G-E WELDING DISTRIBUTOR** today for bulletin GEA-6243 for full details on the new long-life a-c welders. You will find his name and address in the yellow pages of your phone book, and on the next page. See this new G-E welder at the National Metals Exposition at Chicago in November. General Electric Co., Schenectady, N. Y.

710-20



**PROPER COOLING OF EQUIPMENT,** essential for dependable service, is checked in air-flow test, which determines the amount of air moving through welder.

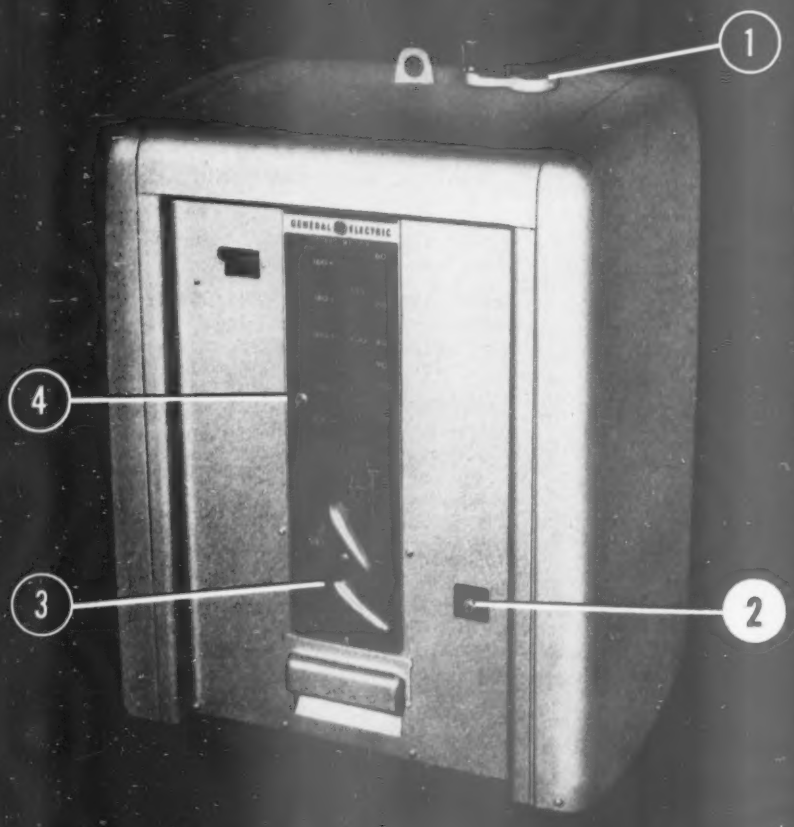
**SIX TIMES RATED VOLTAGE** is applied to primary coil for fifteen seconds, in testing of new a-c welder. This test assures high safety factor for silicone insulation which is used on all coil windings.

| | General Electric | Company A | Company B | Company C |
|---|---|---|---|---|
| Moving Coil Design | ✓ | | | ✓ |
| Aluminum Windings | ✓ | ✓ | | |
| Silicone Insulation | ✓ | | | |
| Hot Start | ✓ | ✓ | ✓ | |
| Arc-Stabilizing Capacitors | ✓ | ✓ | | |
| Large Logarithmic Current Scale | ✓ | | | ✓ |

**COMPARISON WITH OTHER MAKES** shows you that the new G-E a-c welder is your best buy. For more G-E welding news, turn page . . .

GENERAL ELECTRIC

# NEW G-E 300-amp rectifier welder offers full-time arc-force control



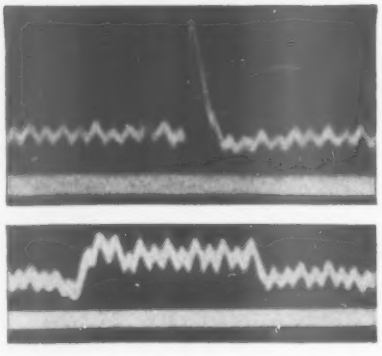

NEW G-E 300-amp rectifier welder offers *full-time* arc-force control . . . and many improved features, including—

1 **FINGERTIP-ADJUSTABLE MOVING COIL:** provides stepless current control for pinpoint accuracy, reduced wear and vibration. Current range is wide—20–375 amps.

2 **ARC-FORCE CONTROL IS FULL TIME:** doesn't cut out in the middle of an electrode. High arc force blasts away short-circuiting metal droplets, which ordinarily freeze short arcs. Results—unusual arc stability, deep penetration, and easy maneuvering.

3 **REVERSING POLARITY SWITCH:** conveniently mounted for instant changing from straight to reverse polarity.

4 **SPRING-LOADED CLEANOUT SWITCH** reverses ventilating fan for blowing dust off rectifiers—prolongs equipment life. Write your G-E welding distributor for bulletin GEA-6242.



**SUSTAINED SHORT CIRCUIT** occurs without arc-force control (lower oscillogram). Metal cools, electrode freezes. With *full-time* G-E arc-force control (upper), metal is blasted away, short circuit is brief.

GENERAL ELECTRIC

## Contact Your G-E Welding Distributor Today

**Alabama:** Birmingham—Alabama Oxygen, Young & Vann Supply; Mobile—Turner Supply

**Arizona:** Phoenix—Consolidated Welding Supply

**California:** Fresno, Los Angeles, Oakland, Sacramento, San Diego, San Francisco, Ventura—Victor Equipment

**Colorado:** Boulder, Colorado Springs, Denver, Durango, Ft. Collins, Ft. Morgan, Greeley, LaJunta, Longmont, Pueblo, Sterling—Hendrie & Bolthoff

**Connecticut:** Hartford, New Haven—Harris Company

**Florida:** Hollywood—Florida Gas & Chemical

**Georgia:** Athens—Welding Gas Products; Atlanta, Macon—Welding Supply & Service; Augusta—Marks Oxygen; Columbus—Williams Welding Supplies; Gainesville—Welding Gas Products

**Idaho:** Boise—Gate City Steel

**Illinois:** Chicago, Moline, Morton, Rockford—Machinery & Welder

**Indiana:** Evansville—Drillmaster Supply; Ft. Wayne, Indianapolis—Sutton-Garten; South Bend—PerryWelding Sales & Service

**Iowa:** Des Moines—Machinery & Welder

**Kansas:** Wichita—Standard Products

**Kentucky:** Louisville—Reliable Welding; Paducah—Henry A. Petter Supply

**Louisiana:** Alexandria, Shreveport—Hughes Oxygen; New Orleans—Consolidated Welding Supplies

**Maryland:** Baltimore—Arcway Equipment

**Massachusetts:** Boston—New England G-E Welding Sales Division

**Michigan:** Detroit—Welding Sales & Engineering; Grand Rapids—Miller Welding Supply

**Minnesota:** Duluth—W.P.&R.S. Mars; St. Paul—Production Materials

**Mississippi:** Jackson—Jackson Welding & Supply

**Missouri:** Kansas City—Hohenschild Welders Supply; St. Louis—Machinery & Welder

**Montana:** Billings—Valley Welders Supply; Billings, Bozeman, Cut Bank, Glasgow, Great Falls, Havre, Kalispell, Miles City, Shelby, Sidney, Whitefish—Valley Motor Supply; Butte, Great Falls—Montana Hardware

**Nebraska:** Lincoln—Lincoln Welding & Supply; Omaha—Baum Iron

**New Jersey:** Kenilworth—Welding Sales Corp.

**New Mexico:** Albuquerque—Industrial Supply Co.; Hobbs—Western Oxygen; Las Cruces, Silver City—Car Parts Depot, Inc.

**New York:** Buffalo—Welding Equipment Sales; New York—Welding Sales Corp.; Syracuse—Welding Engineering & Equipment

**North Carolina:** Charlotte—Dixie Gases; Gastonia—Gastonia Motor Parts

**North Dakota:** Bismarck, Fargo—Acme Welding Supply

**Ohio:** Akron, Cincinnati, Cleveland, Columbus, Dayton, Mansfield—Burdett Oxygen; Toledo—Odland Iron Works

**Oklahoma:** Oklahoma City—Hooper Supply; Tulsa—G-E Welding Sales Division

**Oregon:** Eugene, Portland—J. E. Haseltine; Medford, Portland—Industrial Air Products

**Pennsylvania:** Allentown, Philadelphia, Pittsburgh—Arcway Equipment

**South Carolina:** Columbia, Greenville—Welding Gas Products

**South Dakota:** Deadwood—Hendrie & Bolthoff

**Tennessee:** Chattanooga, Knoxville, Nashville—Welding Gas Products; Memphis—Delta Oxygen

**Texas:** Abilene—M&M Welding Supply; Alice, Corpus Christi—Crane Welding Supply; Alpine, El Paso, Marfa, Pecos—Car Parts Depot; Amarillo—Welding Equipment & Supply; Beaumont—H. & W. Welding Supply; Brownsville, Harlingen—Acetylene Oxygen; Dallas—Hill Equipment & Supply; Houston—G-E Welding Sales Division; Lubbock—Welders Supply of Lubbock; Midland—West Texas Welders Supply; Odessa, Pecos—Western Oxygen; Orange—Marine & Petroleum Supply; Pecos—Welding Supply Co.; Plainview—Plains Welding Supply; San Angelo—Southwestern Welding Supply; Texarkana—Hughes Oxygen; Wichita Falls—McGinnis Welding Supply

**Utah:** Salt Lake City—The Galigher Co.

**Washington:** Seattle, Spokane—J. E. Haseltine; Seattle, Spokane, Yakima—Industrial Air Products

**West Virginia:** Bluefield—Bluefield Supply; Charleston—Virginian Electric; Huntington, Logan—Logan Hardware & Supply

**Wisconsin:** Milwaukee—Machinery & Welder

**Wyoming:** Cody, Lovell—Valley Motor Supply Co.

**Alaska:** Anchorage—Northern Supply

**Canada:** Toronto—Canadian G.E.

**Hawaii:** Honolulu—American Factors, Ltd.

# CRUCIBLE REXWELD hard surfacing rods increased forging die life OVER 400%

*for R. G. LeTourneau, Inc.*

By Rexwelding, R. G. LeTourneau, Inc., Longview, Texas, increased the life of its production dies over 400%. The dies shown, for example, used to forge a plug adapter of SAE 1030 steel at 2350 F, had to be removed from the press after forging 3100 pieces because of excessive wear and heat checking. The same die, after worn areas were machined out and faces built up with Rexweld-A hard surfacing rod, produced 9300 pieces.

You can do the same in your shop. You'll find that Rexwelded dies have higher edge strength at elevated temperatures, and resist chipping, deformation and heat checking better. And parts can be Rexwelded over and over.

So, use Rexweld Rods on your next hard surfacing application. They are available in both bare rods and low hydrogen coated electrodes, in a wide range of grades and sizes. Call your local Crucible representative — he can provide a grade of Rexweld adapted to your specific job.

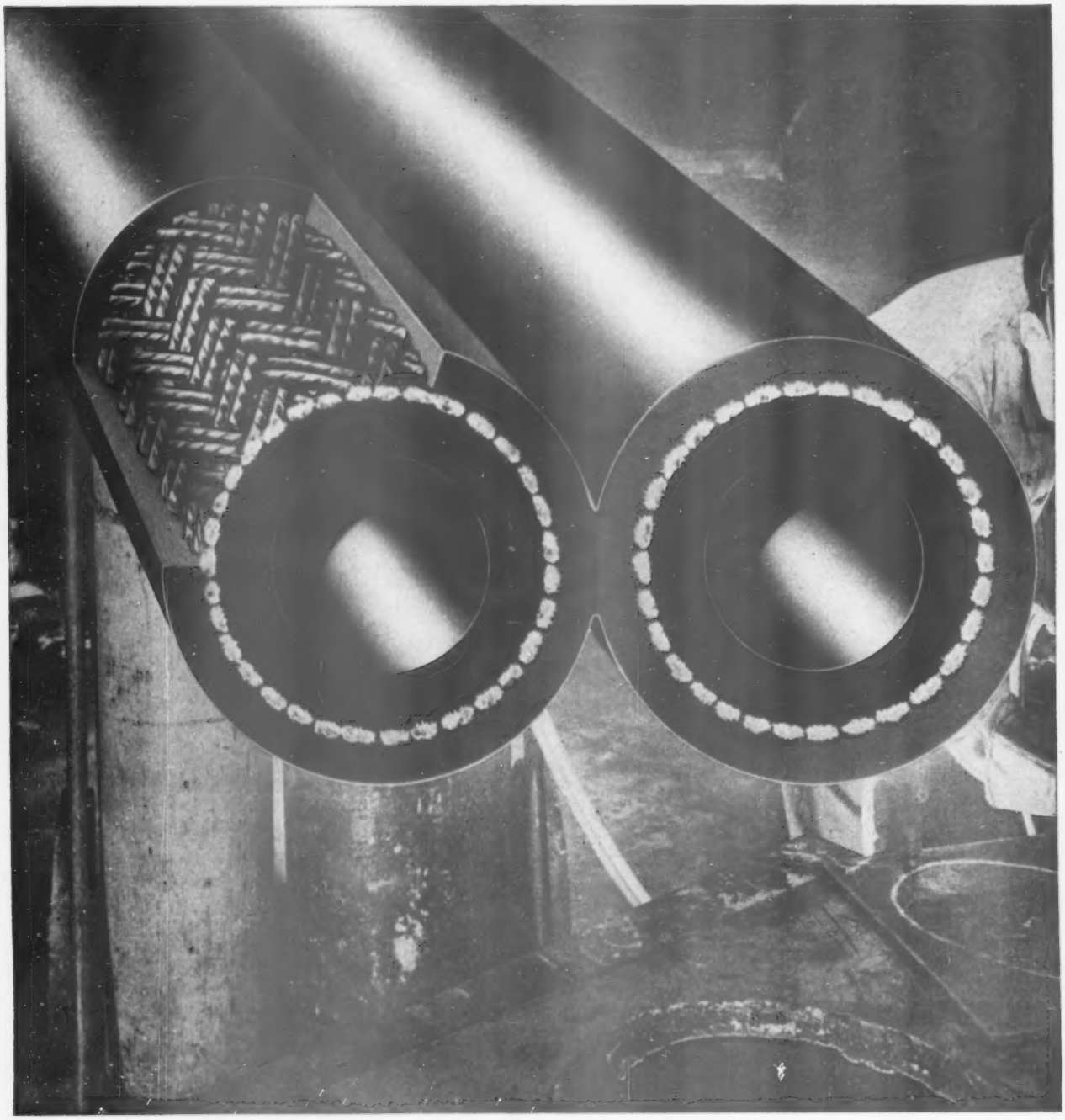
**CRUCIBLE** first name in special purpose steels

*54 years of Fine steelmaking*

**REXWELD HARD SURFACING ROD**

CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.

# Safer Twin-Weld® Hose



**HEWITT-ROBINS**

EXECUTIVE OFFICES, STAMFORD, CONNECTICUT

# Won't Writhe or Twist

***Hewitt-Robins Twin-Weld—the original Twin-Line Welding Hose—Offers Values Found in No Other Hose... Single or Double Line!***

Here is the safest, easiest-handling welding hose that money can buy. Twin-Weld—*the original twin-line welding hose*—won't writhe or twist on the job as other welding hoses do because it's "straight-cured". Its two lines are firmly bonded together, easily separated for making connections. Twin-Weld is non-porous . . . eliminates welding inefficiency, explosions and fires.

For greater safety and maximum flexibility . . . longer welding hose life . . . buy Hewitt-Robins Twin-Weld.

## ENGINEERING DATA

**TUBE:** Non-porous, smooth tube for full free-flowing of gases at all times.

**CARCASS:** Now reinforced with a single braid of high-tensile rayon yarn, applied with special braiding equipment . . . equal in strength and fabric content to the highest quality two braid hose.

**COVER:** New flame-resistant, oil-resistant cover made from premium quality synthetic compound that won't become hard or brittle. Surface is smooth . . . won't crack, peel or discolor . . . resists abrasion of sharp metal, heat, grit, dirt and ozone checking. For quick, positive identification oxygen line is green—acetylene line is bright red.

**SIZES:** O.D.'s now conform to IAA specifications—7/16", 17/32", 19/32" . . . I.D.'s 3/16", 1/4", 5/16".

**WORKING PRESSURES:** Up to 200 psi.

*Here is a partial list of*

**HEWITT-ROBINS PRODUCTS**

*that will help you cut handling costs and increase operating efficiency.*

**MACHINERY**

Belt Conveyors
Belt & Bucket Elevators
Car Shakeouts
Conveyor Idlers
Dewaterizers
Mechanical Feeders
Foundry Shakeouts
Mine Conveyors
Reclaiming Systems
Screen Cloth
Stackers & Trippers
Vibrating Conveyors & Screens

**INDUSTRIAL RUBBER PRODUCTS**

BELTING:

Conveyor
Elevator
Transmission

HOSE:

Acid
Air & Air Drill
Barge Loading
Dust Suction
Fire
Fuel Oil & Gasoline
Gasoline Pump
Mud Pump Suction
Oil Suction & Discharge
Propane-Butane
Road Builders'
Rotary Drilling
Sand Blast
Sand Suction
Sea Loading
Servall®, All-Service
Steam
Tank Car & Tank Truck
Vacuum & Air Brake
Water & Water Suction
Welding, Twin-Weld®

•

***For information and service on industrial rubber products, contact your Hewitt-Robins Industrial Supply Distributor. Through his complete stock of Hewitt-Robins Rubber Products, and his familiarity with local field conditions, he can fill your supply needs promptly and correctly. See Classified Phone Book for the Hewitt-Robins Industrial Supply Distributor serving your area.***

3449

# INCORPORATED

**DOMESTIC DIVISIONS:** Hewitt Rubber • Robins Conveyors • Robins Engineers • Restfoam
**FOREIGN SUBSIDIARIES:** Hewitt-Robins (Canada) Ltd., Montreal • Hewitt-Robins Internationale, Paris, France • Robins Conveyors (S. A.) Ltd., Johannesburg • **EXPORT DEPARTMENT:** New York City.

# RACO gives you UNINTERRUPTED

COSTS NO MORE ... SOMETIMES LESS

**MILD STEEL • MEDIUM CARBON • LOW ALLOY**
**ALUMINUM • BRONZE • SPECIAL PURPOSE ALLOYS**
**CHROME-MOLY • STAINLESS • NICKEL • TITANIUM**

## THREADWOUND COILS
## WIRE ON SPOOLS • CATCHWEIGHT COILS

**STRAIGHT LINE FEED OFF**—Threadwound coils assure straight line feed off. Final reduction to finished size is made on rewinding machines. All butt welds are pulled through finishing die eliminating bumps, kinks and cross overs. All coils have a cast placed in them with a four-inch maximum expansion . . . coils stay in place when tie bands are cut, avoiding looping over sides of pay off reels.

**STEEL BANDS STIFFEN COILS**—Threadwound coils are now being wound on corrugated steel bands for added stiffness.

**UNIFORM WEIGHT**—Threadwound coils are of uniform weight, automatically controlled by our rewinding machines.

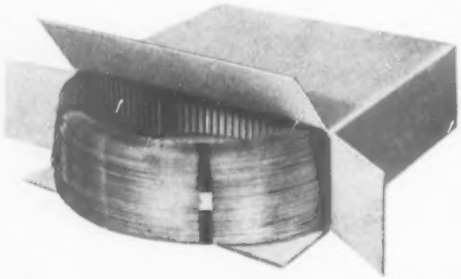
**PALLETIZED CARDBOARD CARTONS**—Threadwound coils are packaged in cardboard containers, then steel strapped on pallets manufactured in our own plant.

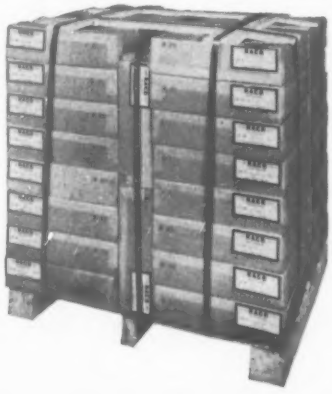
**ENDS OF COILS**—Back end of each coil is securely anchored to corrugated steel band . . . starting end is marked with colored tag and left straight for feeding automatic machines. No cutting or straightening needed.

**ALL COPPER-COATED WIRE IS ELECTRO-PLATED**

**MODERN MANUFACTURING FACILITIES**—We have complete and modern continuous wire drawing equipment, descaling and acid cleaning for hot-rolled wire rod. Annealing and normalizing equipment. We have fourteen wire straightening and cutting machines, and can furnish straightened and cut lengths up to 36", in sizes 1/32" to 5/16". Catchweight coils up to 400 lbs. Threadwound coils in all standard widths and I.D. . . . all standard size spools.

**MANUAL ELECTRODES AND GAS RODS**—Available in 50-pound cartons, shipped on pallets at no extra charge.



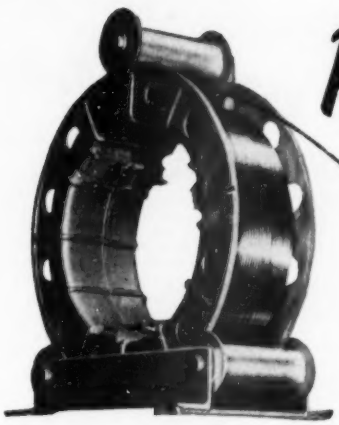


# what it takes for

# AUTOMATIC ARC-WELDING

**RACO COMPOSITE TYPE "A"**

Heavy Coated Open-Arc Electrode. Available in mild steel, low alloy-high tensile, low hydrogen, hard surfacing and stainless steel grades. Two other grades for open-arc welding—RACO TYPE "D" with white flux coating and RACO TYPE "M9" (knurled) with red flux.



*plus*

## THE LATEST IN LABOR-SAVING EQUIPMENT

**RACO FREE WHEELING REELS—SAVE DOWN TIME** by using larger Raco coils. Ball-bearing trunnions enclose the coil so there is no overrun or loose strands and larger coils can be used. Changing coils is a matter of only a few seconds and no tools are required. Available in 12, 14, 25 and 36 inch sizes, for any weight from 50 to 200 pounds.

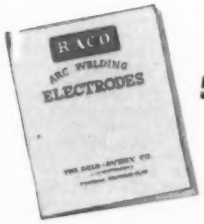
## FOR SUBMERGED ARC-WELDING

### The New RACO Model BW-2

**Outstanding features are:**

1. Adaptability to any job . . . nozzle can be positioned 360° in two planes.
2. Simplified control for either standard or constant potential welders, AC or DC.
3. Easy to install . . . just plug in head and hook up welding cables.
4. Available with various nozzles and attachments for submerged-arc, gas-shielded arc, or open-arc welding of all kinds. Also duplex nozzles and feed rolls for twin arc-welding.
5. Trouble-free operation . . . only three moving parts.

**THE RACO TYPE 4R** automatic head and controls are designed and furnished for use with RACO composite Type "A" wire.

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## *The* REID-AVERY COMPANY *Inc.*

BALTIMORE 22, MARYLAND

***SINCE 1919 PRODUCERS OF ARC-WELDING ELECTRODES AND WELDING RODS***

*Low Temperature*

# EUTECTIC WELDING ALLOYS

# 50th year of WELDGINEERING

## FOR BETTER SOLUTIONS TO EVERY WELDING PROBLEM

## New 1954 DEVELOPMENTS

### NITECTIC 222 (DC)
(Pat. Pending)

The first universal electrode for joining all nickel and dissimilar nickel alloys. Weldor need not know specific nickel base metal because this "Low Amp" EutecTrode reduces danger of damage to base metal. NiTectic 222 does not stick or freeze, provides almost 100% slag coverage, eliminates crater cracking. Runs with extremely short arc, may be used even in contact position. Ideal for all nickel overlays. Used on Monel, Inconel, Stellite, nickel irons, stainless steels and many other heat and corrosion-resistant high nickel alloys. Makes possible welding on nickel metals with carbon content too high for previous nickel electrodes.

### EUTECTRODE 1850 (AC)
### EUTECTRODE 1850 (DC)
(Pat. Pending)

Especially for aluminum bronze—joins 27 different metals and alloys with different expansion coefficients without warpage or stress. 6 times faster than torch bronze brazing. Deposits are 50% harder than bronze brazing, 200% harder than phosphor-bronze, and 15-20% harder than aluminum bronze (ductile type 10). Also available as EutecRod 555 wire for inert gas, shielded-arc welding.

### EUTECTRODE 280 (DC)
(Pat. Pending)

"Low Amp" operation and special FrigidArc coating concentrates heat in the weld area—speeds surface alloying, minimizes undesirable base metal dilution. Ideal for phosphor bronze. Coating stabilizes short arc, provides full slag coverage, easy slag removal. Perfect for brass, bronze, copper . . . for "occasional" weldors . . . makes dense, homogeneous welds on dissimilar metals and overlays that are tough and abrasion resistant.

### XYRON 2-24 (AC-DC)
(Pat. Pending)

"Cold welds" cast iron in all positions. Saves dismantling and preheating. Deposits are crack-free, dense, machinable, with good color match and high tensile strength. Ideal for shops requiring one versatile cast iron electrode as well as for the occasional cast iron weldor. For alloy cast iron Xyron 2-25 provides highest obtainable machinability.

### EUTECTRODE 300 (DC)
(Pat. Pending)

A pure copper electrode with an "AutoThermic" coating that provides its own preheat. By shortening the arc, the weldor can get a high copper content deposit comparable in appearance to an inert gas weld. Works with stable, quiet arc action. Welds have high electrical conductivity.

## FOR METALWORKING WITH LESS "WORK"

**CUTTRODE #1** (AC-DC) — Oxygenless cutting electrode for all metals (cast iron, carbon and stainless steels, Monel, nickel, aluminum, copper, etc.) Requires no auxiliary equipment. Saves hours of chipping, gouging, scraping, grinding for pennies.

**CUTTRODE #2** (AC-DC)—Oxygenless UNDER-WATER cutting electrode.

**CHAMFERTRODE** (DC) — Chamfers and gouges all metals with electric arc. No oxygen required. Unusually fast removal of excess metal, old weld metal, preparing sections for welding, routing out unwanted sections. On many jobs provides enough "preheat" for immediate "non-fusion" welding — saves preheat time.

**THERMOTRODE** (DC) — The fastest known means of pre-and-post heating with electric arc. No oxygen or auxiliary equipment required.

## from the pioneers in CONTACT ELECTRODES

**HAND-O-MATIC #1** (AC-DC) — The original contact electrode introduced in America by Eutectic. Hand-O-Matic anti-fatigue contact electrodes have been copied but never equalled. Best as an all-position electrode on thin gauge, mild steel welding.

**NEW HAND-O-MATIC #2** (AC-DC) — The first mild steel electrode with automatic slag removal. Greatly reduces welding time, finishing costs. Can be used on a wider variety of light gauge base metals than conventional electrodes due to new coating and lower heat input.

## THE 27 MOST WIDELY USED EUTECTIC WELDING ALLOYS

## to replace conventional materials

### FOR CAST IRON JOBS

**EUTECROD #115*** (Torch) — An amazingly "cold filler" (354°-600°F.) for sealing cracks, defects; for emergency repairs on cast iron. (Patented)

**EUTECROD #142FC*** (Torch) — Ensures high strength, machinable, color-matching deposits on gray and alloy cast iron. (Patented)

**EUTECROD #146FC*** — Low cost bronze type alloy for all jobs on cast iron, steel, brass, bronze, copper, malleable iron, galvanized.

**XYRON #2-24** (the new, improved EutecTrode #24)—"Low Amp" electrode for cold welding cast iron without preheating or dismantling. (Pat. Pending)

**EUTECTRODE #25** (AC-DC) — High strength, machinable electrode for troublesome alloy cast iron. (Pat. Pend.)

**EUTECTRODE #27** (AC-DC) — "Low Amp" cast iron electrode for non-machinable deposits.

### FOR STEEL JOBS

**EUTECROD #16FC*** (Torch) — Highest strength "thin-flowing" patented alloy for all steels. (Patented)

**EUTECROD #1800*** (Torch) — High silver content, cadmium free alloy with exceptional capillary flow. Ideal for extremely low heat joining of closely fitted steels, copper, and nickel alloys.

**EUTECROD #1601*** (Torch) — Highest strength silver-content alloy for joining carbide tips; for production joining parts of very light gauge metals.

**EUTECTRODE #68**(AC) — 680(DC) — Toughest electrode made for joining all high alloy steels. (Patented)

**STEELTECTIC** (AC-DC) — "Universal" steel electrode welds without slag interference. (Patented)

**HAND-O-MATIC** (AC-DC) — High speed production, contact-type, no-gap mild steel electrode.

**EUTECTRODE #600** (DC) — Machinable "Low Amp" electrode for welding sheet metal in all positions.

### FOR ALUMINUM JOBS

**EUTECROD #190*** (Torch) — For high strength joints on thin aluminum alloys. (For "poor fit" use EutecRod #21*).

**EUTECTRODE #2101** (DC) — First easy-to-control, maximum strength electrode for cast and wrought aluminum. (Pat.)

### METAL WORKING ELECTRODES

**CUTTRODE** (AC-DC) — Cutting-piercing electrode "slices" metal without air or oxygen. (Pat. Pending)

**CHAMFERTRODE** (DC) — Chamfering-grooving electrode blasts away unwanted metal without air or oxygen. (Pat. Pending)

**THERMOTRODE** (DC) — For localized heating and preheating . . . all three without supplementary air or oxygen or special equipment of any kind. (Pat. Pending)

### FOR COPPER, BRASS, BRONZE SALVAGING JOBS

**EUTECROD #1801*** (Torch) — "High Silver," thin-flowing alloy for steels and non-ferrous metals.

**EUTECROD #185FC*** (Torch) — Dual-purpose bead forming alloy for joining and for machinable overlays. (Patented)

**EUTECROD #800*** (Torch) — Thin-flowing alloy for copper, brass and bronze. (Patented)

**EUTECROD #180*** — For high strength joints on thin-walled and intricate copper and copper alloy parts.

**EUTECROD #18FC*** (Torch) — Low melting, high strength universal alloy for dense, homogeneous bonds on steel, galvanized sheet, brass, bronze and copper alloys.

### FOR WEAR, ABRASION, BUILDING UP, IMPACT, CORROSION

**EUTECTRODE #2** (AC-DC) — For economical wear, and abrasion-resistant overlays on all steels.

**EUTECTRODE #2B** (AC-DC) — For machinable overlays and welds to resist abrasion and impact on all ferrous metals.

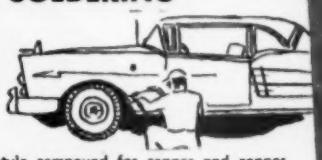
**EUTECTRODE #10** (AC-DC) — "Low Amp" electrode for super-hard, abrasion-resistant overlays.

**EUTECROD #11FC***—Hard overlay with maximum wear resistance for oxy-acetylene torch welding on ferrous metals.

**For best results, use with corresponding special Eutector® Superflux*

In more than 78,000 American welding shops . . . and many more throughout the world, Eutectic Low Temperature Welding Alloys are used and preferred. This preference is the result of Weldgineering . . . the constant development and improvement of "Low Temp" EutecRods (gas) and "Low Amp" EutecTrodes (arc) to cut welding time, improve welding quality and lower welding cost. Weldgineering is just one more reason why you can rely on Eutectic . . . "America's Leading Institution Devoted to the Research and Manufacture of Specialized Metal-Joining Alloys" . . . for solutions to your welding problems. The alloys described here, or many others not shown, can solve your welding problems too . . .

## FOR EASIER SOLDERING



**EUTEC-TINWELD** — Original solder-paste-flux "paint-on" compound. For easy, one step soldering-tinning of all metals (except white metals). Superior to ordinary lead-tin solders in 6 money-saving ways. Available in 2 and 5 lb. tins in four formulations — regular, lead-free, neutral, refrigeration.

**NEW EUTEC-COPWELD** — "TinWeld" style compound for copper and copper alloys. Eliminates costly solder rings and shims. Greatly simplifies induction and resistance welding. Saves pre-placement time. Good conductivity and corrosion resistance. In 20 oz. cans.

**NEW ALUTIN #51** — Lowest melting flux-containing alloy for bonding all metals including aluminum. Perfect for hard-to-wet metals. For all heating methods. Simplifies joining all metals, filling voids, building up fillets. Handy 5 lb. "Protecto-Spool."

## FOR LONGER LASTING OVERLAYS WITHOUT WARPING

**EUTECHROM #2** (AC-DC). For low-cost abrasion and mild impact resistance. Features exclusive electrode coating which, like all Eutectic overlay materials, ensures bonding at lowest possible heat.

**EUTECHROM #10** (AC-DC). For resistance to severest types of abrasive wear. Hardness at red heat far superior to ordinary electrodes which become soft at same temperature.

**EUTECTRODE 68** (AC), 680 (DC). Very high alloy steel overlay electrode, unsurpassed for tool and die salvage. A "must" for every shop needing high quality maintenance and salvage.

**EUTECROD 185 FC** (torch). Welding's most advanced rod over bronze welding for machinable overlays. Harder, tougher, easier to apply than conventional bronze rods. (use with Eutector Flux 185)

**FRIX.** The most economical overlay material available. Provides wear expectancy three times that of phos-bronze materials.

**INSTANT HARDNER #75.** The only cyanide-free easy-to-use hardening compound for small tools and parts without heat treating.

**KROMOLAY 6900.** For skin-thin preventive maintenance overlaying of new and used steel parts. High wear, corrosion, heat resistance.

*Eutectic, a specialist in the hard overlay field, also offers improved EutecRods and EutecTrodes for high speed steel — EutecTrode 5HSS-FC (torch), EutecTrode 6HSS (AC-DC).*

November 1st to Novembe[illegible]th

WELC[illegible]

November 1st to November 5th

WELCOME

to Eutectic's idea exchange reception suite during the National Metal Exposition in Chicago. See us at the Sherman Hotel . . . enjoy refreshments with us . . . relax and review welding's progress.

## START YOUR WELDING SAVINGS WITH THESE HANDY KITS

**HANDY, ECONOMICAL WALL PACKS—ONLY $29.50**

Liberal introductory quantities of most-used EutecRods and/or EutecTrodes for all common metals, jobs. Priced at 25-lb. rate, shipped in metal wall cabinet with complete instructions. Ideal "small shop" selection for the "occasional" welder and solderer. Assortment for gas and/or arc welders.

**WORK SAVING CHEMICAL AIDS KIT — ONLY $9.95**

A generous supply of pre/post cleaners, "EutectoMask," "Form-A-Jig," Cyanide-free Instant Hardener #75, "Mark-A-Cut" Pencil, Kromolay 6900 quick overlaying compound and standard size can of Eutec-TinWeld — the time and labor saving new solder-paste-flux compound.

**NEW! EUTECTOR FLUX KIT — ONLY $9.95**

An ample assortment of famous Eutector Fluxes (6 universal, 3 aluminum, 2 cast iron, 1 magnesium). All with four important advantages over commercial fluxes — (1) Indicate correct welding temperature automatically, (2) Automatically clean the work, (3) Promote bonding action, (4) Encourage alloy flow — make "a little alloy go a long way."

**POPULAR SOLDERING KIT — ONLY $9.95**

Standard introductory packages of 4 Eutec-TinWeld compounds, AluTin No. 51 (for aluminum, hard-to-wet metals), EutecRod 115 (for cast iron), EutecRod 152 (low-melting, lead-free solder-type alloy for copper and steels), plus companion Eutector Fluxes. Convenient storage kit with every unique Eutectic solder-replacing product needed for "occasional" repairs on all metals. For all heating methods.

*(Helpful, complete instructions accompany each WALL PACK and KIT).*

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OK Eutectic, show me, without obligation on my part, how your "Low Temperature Welding Alloys" can make my welding "Better, Faster and Cheaper". I'm interested in "non-fusion" welding of (name parts, base metals, etc.)

**SEND ME YOUR FREE TECHNICAL DATA ON MODERN WELDING PROCEDURES FOR**

(circle the metals you are interested in)

Cast Iron — Steel — Stainless Steel — Aluminum — Copper — Nickel — Brass — Bronze — Magnesium — Zinc Die Casting

**I want to start saving with "non-fusion" procedures NOW — so send me the following kits —**

- ☐ WALL PACK #1 (for Arc Welders $29.50)
- ☐ WALL PACK #2 (for Gas Welders $29.50)
- ☐ WALL PACK #3 (for Arc and Gas Welders $29.50)
- ☐ SOLDERING KIT @ $9.95
- ☐ CHEMICAL AIDS KIT @ $9.95
- ☐ FLUX KIT @ $9.95

☐ CHECK ENCLOSED (Eutectic pays postage) ☐ BILL ME ☐ BILL MY COMPANY

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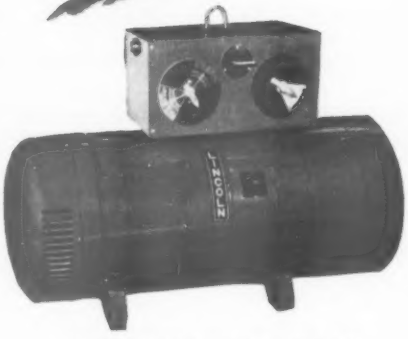
# WELDERS ALWAYS ASK:

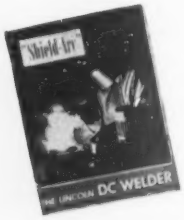
## "But is it as good as a Lincoln 'Shield-Arc'?"

Here's why the Lincoln "Shield-Arc" welder is *the standard of comparison* for arc welders:

1. "Shield-Arc" delivers *any* type of direct current arc... not one or two types.
2. "Shield-Arc" delivers constant output of current, regardless of line voltage fluctuations.
3. "Shield-Arc" welders are constantly improved to weld faster ... at lower and lower costs.



LINCOLN "Shield-Arc" SAE
DC MOTOR-GENERATOR WELDER
200-300-400-600-900 amps.

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**THE LINCOLN ELECTRIC COMPANY**
**DEPT. 1709 • CLEVELAND 17, OHIO**
**THE WORLD'S LARGEST MANUFACTURER OF ARC WELDING EQUIPMENT**

ESTABLISHED 1916 **Welding Engineer** OCTOBER, 1954

# *What's your hurry?*

MOST of us race along as though we were going to a fire when, in reality, we are not going anywhere. Senseless speed—that is, speed just for speed's sake—is the curse of this hectic era.

On cross-country motor trips, I have seen many who risk life and limb (and not only their own) by turning the highway into a racetrack. The strange part about it is that drivers who passed me at 85 miles or so while I was moseying at a comfortable 50 to 60 miles would usually sleep in the same hotels that I did each night. I got there, too. A bit later, of course, but my brake bands and tires were less worn and my nerves were likewise in better condition.

I slipped myself, though, by running to catch a bus and landed in the hospital with a broken leg. While taking my enforced rest cure, I decided that not only does haste make waste, but that haste is luxury I simply can't afford in the future. It takes too long to make up the time you don't save, if you know what I mean.

There is a saying that has come down to us from remote antiquity that is as true today as it was two thousand years ago. Ponder these words:

"Whom the gods would destroy, they first make mad."

Hurrying is a form of madness, and it can destroy just as surely as any other instrument of the vengeful gods.

NEXT to me in the hospital was a poor fellow who had taken a nap on his commuter train and woke up just as it was pulling out of his station. The next station was five minutes away, but he didn't want to wait. So he got up, opened the door and hopped off the moving train.

That happened last April, and he hasn't got home yet. For Ed became a triple amputee, losing both legs above the knee and his left arm above the elbow when he was thrown under the train he was in such a hurry to leave.

Another of my acquaintances was hurrying to catch the train that took him to work. The train was in the station, but he was on the wrong side to board it. He ran quickly around it—or tried to. He never made it because he stepped right in front of another train just coming into the station. That morning a whole trainload of commuters was late to work. And one man will never work again.

DID you ever stand in the lobby of an office building or by a factory entrance at quitting time? The people are certainly making a mad rush to get outdoors and perhaps you can't blame them for wanting to hurry home. But some people seem just as anxious to get to work. So anxious that they won't take the time to change to safety shoes or hard hats or whatever the job requires in the way of safety clothing.

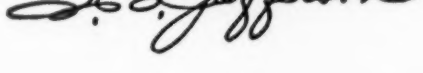
I am thinking particularly of a weldor who "hadn't time" to put on safety goggles when he did chipping or grinding. A particle of steel in the eye taught him safety, but it was a costly and painful lesson. Some things can be learned only by experience, but let's let them be others' experiences, not our own.

Don't be fooled into thinking safety is something for the other fellow. It's something for you. About as important a something as there is. The college textbooks will tell you that self-preservation is the first law of life. Disregard that law and you don't deserve to live. And you probably won't live long.

Besides his own safety, which he insures by wearing the proper clothing and giving himself adequate eye and face protection, a weldor has other responsibilities for safety. He is responsible to fellow workers to see that they are protected from flash and other hazards of welding. And he is responsible to management to see that proper fire precautions are being observed. If the floor is littered with easily inflammable rubbish, a weldor is a fool to do welding or flame-cutting until it is cleaned up. It's his responsibility as well as that of the management.

Do you want to live to grow old—to reap the benefits of your pension? Then be safe. The safe way is the shortest way in the long run.

No one is in a hurry to grow old. So what's your hurry now?



# * Buy Victor and get Torch Versatility

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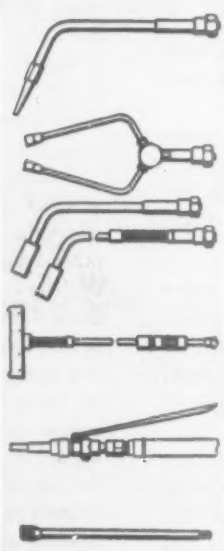

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# Come to Chicago!

**The program for the 1954 national fall meeting of the American Welding Society holds all the ingredients of a highly successful get-together. Will we be seeing you at the Sherman Hotel, November 1 through 5?**

IF PAST performance be any criterion, some 1,500 welding and production engineers, technical management men and others will attend the 19 technical sessions of the American Welding Society's annual fall meeting. The meeting will be held in conjunction with the yearly Metal Show at the Sherman Hotel, Chicago, Monday through Friday, Nov. 1-5.

There will be 56 papers presented at the welding convention. The subjects are varied and include the welding of titanium, zirconium and molybdenum; the use of welding in the production of aircraft and guided missiles; welding high-temperature materials; inert-gas welding; resistance welding; fused metal coatings, etc.

A highlight of the meeting will be the annual Adams Lecture on Monday morning. It will be given by William L. Warner, of Watertown Arsenal, whose subject is intriguingly titled, "the toughness of weldability." At this same session a number of medals and prizes will be presented to individuals for outstanding contributions to the betterment of welding.

### Undergraduate Award Winners

O. P. Eberlein and R. C. Waugh have been selected as authors of the best student paper on welding to appear in an undergraduate publication during the year ending June 1, 1954. Their article on underwater metal-arc welding was printed in the May, 1954, issue of *The Cornell Engineer*.

Second prize goes to Richard Hayes, of Massachusetts Institute of Technology. His article on recent ship failure studies appeared in the March, 1954, issue of *Tech Engineering News*. These annual undergraduate prizes of $200 and $100 are sponsored by A. F. Davis, vice-president and secretary of the Lincoln Electric Co., Cleveland. The winners of other welding awards, medals and prizes will be announced at the convention.

### That Technical Program

The technical program appears to be an excellent one. Sampling it, we find six papers on resistance welding, to be given at two sessions on Monday afternoon and Tuesday morning. Authors and their subjects are:

W. G. Fassnacht, Bendix Aviation Corp., flash welding of high-strength steel; Ernest F. Nippes, Warren F. Savage, Gordon Grotke and S. M. Robelotto, of Rensselaer Polytechnic Institute, effect of post treatment on the properties of flash welds; V. N. Krivobok, of International Nickel Co., and J. A. Choquet and G. Welter, of Ecole Polytechnique, the effects of prestressing on the strength characteristics of spot welds in 17-7 stainless steels under cyclic loads; J. W. Kehoe and D. R. McCutcheon, Westinghouse Electric Co., spot welding of aluminum with single-phase equipment; M. L. Begeman and Gene C. Walker, University of Texas, seam welding of low-carbon steel; A. L. Quinlan, Western Electric Co., automatic percussion welding.

Some new developments in manual metal-arc welding will be covered in a Tuesday morning session. D. L. Mathias, Arcrods Corp., will discuss

John J. Chyle

C. P. Sander

G. O. Hoglund

E. Donald Peters

J. Lyell Wilson

J. H. Humberstone

## 1954-1955 officers and directors of AWS

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recent developments in contact electrodes; Jerry Hinkel, Lincoln Electric Co., will deliver a progress report on electrodes with powdered-metal coatings, and G. K. Willecke, Miller Electric Mfg. Co., will take on metallic rectifiers for arc welders.

Inert-gas welding will be covered by R. W. Tuthill, General Electric Co., new techniques; F. J. Pilia, Linde Air Products Co., inert-gas welding of stator packs, and John L. Lang, Lukenweld Div. of Lukens Steel Co., production application on mild steel.

Automatic welding will be represented by only two papers: how to apply semiautomatic submerged-arc welding, by Robert A. Wilson, Lincoln Electric Co., and automatic hardfacing with mild-steel electrodes and agglomerated-alloy fluxes, by J. S. McKeighan, also of Lincoln Electric Co.

Cutting by flame and other methods will be treated by papers given on Thursday and Friday mornings. Authors and subjects are: R. L. Deily and J. R. Kirwin, Air Reduction Sales Co., oxygen cutting with iron powder and chemical flux; R. S. Babcock, Linde Air Products Co., metal inert-gas arc cutting; Edward H. Roper, Air Reduction Sales Co., improved oxy-fuel gas combustion; C. H. Cowan, Avondale Marine Ways, Inc., and J. R. Kirwin, Air Reduction Sales Co., mechanized flame descaling, dehydrating and priming.

A symposium on fused metallized coatings, sponsored by the AWS committee on metallizing, is scheduled for Wednesday afternoon. Papers will be given by Bela Ronay, U. S. Naval Engineering Experiment Station; Harvey S. Miller, New England Hardfacing Co., and Sam Tour, of Sam Tour & Co., Inc.

Surfacing and brazing will each be allotted one technical session. At the surfacing session on Tuesday afternoon, papers will be given on high-nickel alloy overlays on ferrous metals, on the inert-gas metal-arc overlay process and on automatic hardfacing in the mining and construction industries. The paper on high-nickel overlays is jointly authored by George R. Pease, H. B. Bott and H. C. Waugh, all of International Nickel Co. The inert-gas overlay process will be handled by C. R. Felmley, Air Reduction Sales Co., Inc., while I. R. Bartter, Automatic Welding Co., will deliver the automatic hardfacing paper.

At the brazing session on Wednesday afternoon, C. H. Chatfield, Handy & Harman, will discuss the silver brazing of refractory metals. W. H. Munse and D. C. Crawford, University of Illinois, have a joint paper on filler-metal strengths in brazed copper joints. Nikolajs Bredzs, Armour Research Foundation of Illinois Institute of Technology, will report on the results of an investigation of the factors determining the tensile strength of the brazed joint.

Aircraft and rocketry will be allotted two full sessions on Wednesday morning and Thursday morning. Of the six papers scheduled, the one on high-strength aluminum-alloy rocket motor tubing, by W. S. Tenner and H. C. Wheeler, U. S. Naval Ordnance Test Station, would seem to be the most out of the ordinary. Another that looks interesting is the paper on high-temperature alloy brazing of thin materials for jet engines, by A. S. Rose

Ross J. Yarrow

J. R. Stitt

H. Jackson

James B. Davis

Ralph H. Smith

and W. N. Lewis, both of I-T-E Circuit Breaker Co.

A Wednesday morning session will be devoted exclusively to three metals: titanium, zirconium and molybdenum. Other sessions will cover the broad subjects of weldability (three sessions), pressure vessels and piping, design and production, high-temperature materials and structural welding.

### Plant Visits

Wednesday morning, a tour will be made of the Hotpoint Company's new refrigerator manufacturing plant at Cicero, Ill.* This new plant, formally opened October, 1953, occupies about one million square feet of floor space and utilizes a main assembly conveyor line 7,000 ft long. Here latest scientific equipment and instruments reduce the moisture content in the refrigerators to as low a point as it is humanly possible to attain, while leak detectors detect leaks so small that it would take 200 years for 1 oz of the refrigerant liquid to leak out. Several welding and brazing operations will be seen, including many modern, completely automatic resistance and inert-gas welding applications.

Thursday morning, a tour will be made of the Whiting Refinery and Research Laboratories of the Standard Oil Company of Indiana.† The refinery proper, covering 1,100 acres, is one of the largest refineries equipped to make a complete line of petroleum products. It processes an annual average of 208,000 bbl of crude oil per day with a daily gasoline output of 3,700,000 gal. Besides gasoline, the refinery produces very sizeable amounts of fuel oil (domestic and industrial), asphalt, greases and other oil products.

*See article, "Refrigerator plant of tomorrow," Welding Engineer, January, 1954.
†See article, "Piping and petroleum plus welding and flame-cutting," Welding Engineer, August, 1954.

On the social side, the national fall meeting will offer the Presidents' Reception at 6:00 p.m., Monday evening, to be followed by an 8 p.m. dinner. You'll have a swell time. Also on the social side, an extensive program of entertainment has been scheduled for the visiting ladies.

Those members and guests who have attended annual meetings of the American Welding Society in the past know how much effort and planning are required. These meetings are only possible because of the willingness of AWS members to contribute in capacities ranging from program speakers and session chairmen to the boys who letter the signs (no mean job) and run the projectors. No glory in these last-named tasks, but there are always willing workers to undertake them, just to help out.

### Know AWS

Over 100 technical committees and subcommittees are regularly functioning in the preparation of the codes, standards and specifications that the American Welding Society issues for use by industry. A similar group is at work on the *Welding Handbook* and other educational books. These committees are composed entirely of members from industry, who contribute their time and knowledge voluntarily to advance the general welfare of the welding industry. These many technical activities serve to the advantage of every member of the Society, both directly and indirectly.

The American Welding Society is recognized nationally and internationally as the authoritative source for welding information in the United States. Code-writing and other regulatory bodies look to AWS for recommendations as to specific requirements for the application of welding in different industries.

These same standards serve as a source of up-to-date, authoritative information of practical value to individual members. Many a puzzling question has been answered by reference to an AWS standard. To assure yourself the fullest benefit from your membership in the Society keep posted on these standards!

### And Further—

The national meetings in the spring and fall steal most of the publicity, but the benefits of section meetings are tangible and self-evident. Fundamentally, a section meeting provides an opportunity to hear the experience and ideas of a well qualified person on some welding process or application. Clearly the speaker is making his contribution, but there is a contribution that you yourself must make at both national and section meetings. You must be willing to participate in the discussion of papers, to ask questions that will bring out further points and to report on ideas or experiences of your own bearing on the subject. If your contribute an idea, it may prompt a similar contribution by another member that will be of direct help to you.

A priceless benefit to be derived from section meetings is the opportunity to make friends having mutual interests. Furthermore, if you have administrative ability, you should be active in section management; by contributing to the management of your section, you may gain experience as well as prestige which will prove valuable to your career. The big shots in the welding industry have all been active in AWS activities.

To sum it all up, this is your Welding Society. It is and has always been the sort of technical society to which every member can point with pride. Come to Chicago and learn more about it.

*Defense Dept. photo (Marine Corps)*

**FELIX DE WELDON, sculptor of memorial, with his original scale model (on stand)**

*Defense Dept. photo (Marine Corps)*

**SCULPTOR De Weldon checks a 14-ft M-1 rifle on the full size plaster model. This model was cut into many pieces for casting**

# Giants of Iwo Jima made

For generations people have been retorting, "Tell it to the marines." Now the marines will tell it to the world with a 78-foot memorial of Iwo Jima heroism.

**BY HERMAN C. PHELPS**

THE inner defenses of Japan, long considered impregnable, cracked wide open on February 19, 1945, when the U. S. Marines landed on Iwo Jima. Iwo Island, being only 750 miles from Tokyo, was guarded by a fantastic network of caves, pillboxes and blockhouses. The Japanese garrison, numbering more than 20,000 men, fought desperately from within these strong positions, which had to be reduced the hard way by men on the spot.

*Courtesy American Brass Co.*

**BARE rod, 36 in. long, served for both arc and oxyacetylene welding**

On February 23, the Twenty-eighth Marine regiment stormed Mount Suribachi, an extinct volcano 554 feet high. A patrol headed by Lieutenant Harold C. Schrier, of Richmond, Mo., battled its way to the top and raised the American flag. This act of heroism was photographed by an Associated Press photographer named Joe Rosenthal, who accompanied the patrol.

The picture of a group of marines struggling to erect a flag was easily the most famous photograph of World War II. It was featured in advertising the Seventh War Loan and was reproduced on a commemorative postage stamp. Now the scene is to be permanently preserved in bronze as a Marine Corps War Memorial.

The hundred-ton statuary group of the flag raising on Iwo Jima will be located on a 7½-acre tract on the northern edge of Arlington National Cemetery, at a site overlooking Washington across the Potomac River. The largest cast-bronze statue in the world, its overall height, including the base, will be 78 ft. A cloth flag will fly atop the 30-ft flagpole in the hands of the six bronze giants.

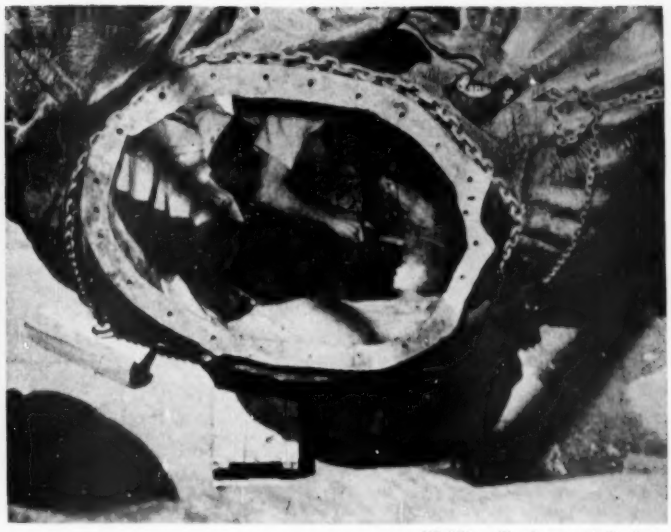
The ground-breaking date was set to coincide with the ninth anniversary of the Marine Corps landing on Iwo Jima, and the Memorial will be officially dedicated on November 10, the Marine Corps birthday. At present writing, the huge statue is being cast in bronze at the Bedi-Rassy Art Foundry, Brooklyn, N. Y. The various castings are fitted together, bolted on the inside and welded into larger sections. The final three sections will be trucked to Washington (free) by the Ford Motor Co. and assembled on the site.

All welding is being done by one man, Eugene Bedi, of Bedi-Rassy Art Foundry. Mr. Bedi has been arc welding for six years and oxyacetylene welding for 24 years, so he knows how to go about it. Each of the giant figures requires 200 ft of welds, and Mr. Bedi's total welding time for the entire job is scheduled at six months.

The bronze is ⅜ to ½ in. thick and

*Courtesy American Brass Co.*

**PERCHED on a gigantic arm, Eugene Bedi, of Brooklyn, welds a hand to a cuff**



*Welding Engineer staff photo*

**MR. BEDI down inside a leg. Temperature was 130 F—about as much heat as a human being can stand. Even a blower didn't help**

# by welding bronze castings

is an alloy of 88% copper, 6% zinc, 4% tin. The balance (2%) consists of lead and impurities. Approximately 75% of the welding is by metal-arc and 25% by oxyacetylene. Though the arc process, naturally, is the faster, the welding torch is more versatile, according to Mr. Bedi. He can gas weld in any position, but the arc is limited to downhand welding only.

The most remarkable feature of this rather remarkable job is that Mr. Bedi uses the same rod for both arc and gas welding. It is a bare phosphor-bronze rod of an alloy of 89.75% copper, 10.0% tin and 0.25% phosphorus. Though this is not exactly the same composition as the base metal, it provides a color match—one of the indispensable requirements. Asked why he didn't use flux-coated bronze electrodes, Mr. Bedi complained that they smoked too much and that he couldn't produce as good a weld nor as good a color match.

He's been welding for a long time, and who are we to question success? The point should be also mentioned that copper is not an easy metal to oxidize in comparison to, say, steel.

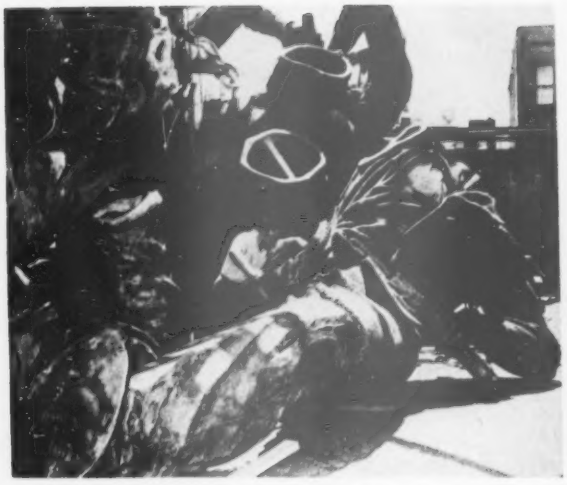
The rod Mr. Bedi uses is 36 in. long and generally 3/16 in. in diameter. A 1/8-in. rod is used on small areas like the knuckles of a hand. At the time of the writer's visit, 2,000 lb of bronze rods had been consumed.

**REMINDS you of Gulliver's Travels, doesn't it? Giant flat on back has not worn out his shoes; holes are where the statue will be anchored**

### Oxyacetylene Welding

Even though there is only a minute quantity of lead in the bronze, the torch adjustment is highly oxidizing. Bedi uses pressure of 70 psi oxygen, 30 psi acetylene, which gives an almost entirely blue flame. If the torch adjustment is not oxidizing, the bronze will turn spongy just like a sponge cake.

The melting point of the statue metal is approximately 1,900 F, and the rod melts at 1,832 F. Bedi preheats as



IT'S not easy to figure out the right way to hoist it

FILLING in gaps by arc welding. Note the smooth beads

small an area as possible and fills the whole vee with one pass. The faster he welds, the less chance of cracking. The preheat is actually only a warm-up for a minute or so when starting in the middle of a bead. Practically no preheat is used when starting at edges.

The statue is so big that is requires a bead 6 ft long just to weld one of the figure's arms at the elbow. Altogether, over 300 welded joints are required.

Occasionally, a small crack will appear at the end of a weld after an arm or leg has been welded circumferentially. This is peened together. If the crack can be welded downhand, it is welded by the metal arc.

### Arc Welding

Since all arc welding has to be done in a downhand position, considerable hoisting and positioning are required. Most beads are contoured; there isn't a flat weld on the whole statue. All joints are flanged 3 in. and then welded inside and out. If the metal has moisture in it, or if it's a damp day, the arc is at first unstable, but this wears off as the heat builds up in the base metal. As soon as the casting reaches a temperature of 100 F, the arc becomes stable, and welding is easy.

On hot days, the arc works best, but hot days are the worst time for Mr. Bedi. The temperature gets to 130 F or more inside a casting, and even a blower won't cool it off.

Arc welding is done with a current of about 175 amp, reverse polarity.

Work on the heroic-sized statuary group has actually been going on since release of the stirring World War II photograph. Almost immediately after release of that picture, Felix de Weldon, an internationallly known sculptor who was then on duty with the Navy, constructed a small scale model. A life-size model followed, for which the three surviving members of the team of flag-raisers posed. These men are: Corpl. Ira Hayes, of Bapchule, Ariz.; Corpl. Rene A. Gagnon, of Hooksett, N. H., and Pharmacist's Mate Second Class John H. Bradley, of Appleton, Wis. Bradley was a Navy Corpsman attached to the Marine Corps.

The faces of the three other men, who were killed in later stages of the Iwo Jima battle, were also modeled in clay. Marine Corps photographs and personal data were used for references.

Various Marine Corps officials and friends of the Marine Corps agreed that the Iwo Jima flag raising symbolized the spirit of determination, pride and patriotism of the Marine Corps as nothing else could. Plans were discussed for a heroic-sized statue, and de Weldon began working on the project at his Washington, D. C. studio in late 1945.

The stages of construction, until the present, were these:

Full-sized heads of the figures were modeled in clay over steel framework. These enormous heads measure five ft from neck to top of the helmet. One of them (upside down) is shown on this month's front cover.

A steel framework, approximately duplicating the bone structure of the human body, was laid out to support each of the statue figures.

Equipment—rifles, canteens, bayonets, etc.—was modeled in clay, molded in plaster and cast in plaster.

The rough work of modeling the upper parts of the bodies in the nude was completed.

The statue was ready to be lifted to the proper height by riggers. Six truckloads of timber were used to shore up the upper section. Screw jacks lifted the statuary inch by inch as shoring was built underneath.

Legs, arms, hands and shoes, all done in plaster, were added.

Before the nude figures were clothed, the texture of Marine Corps uniforms was studied under a powerful magnifying glass, which enlarged to the same scale as the statue. The texture thus revealed was modeled into the clothing. The result was that the plaster clothing breaks the reflection of the light in the same way as the weave of a combat uniform does. Wrinkles, creases and seams were carved on the uniform to give them appearance of having been actually worn in combat.

### Sliced Into 108 Pieces

When the plaster model had been completed and approved, work immediately began on the dismantling of the huge and bulky object for transportation to the bronze foundry. The model had to be cut into 108 separate pieces, an extremely delicate process. Each piece had to be so carefully cut that no joint would show after the sections had been cast in bronze and welded together.

*(Continued on page 42)*

# 444 metals exhibits here

BY WALTER MORRISON

AT PRESENT writing, 444 firms will occupy space in the International Amphitheatre, Chicago, when the 36th annual National Metal Congress and Exposition opens on Monday, November 1. This big event of the metals year will continue through Friday, November 5. It is the ninth such show to be held in Chicago, which city also had the distinction of being host to the first National Metal Exposition, held way back in 1919.

### Acres of Exhibits

The 1954 National Metal Exposition will be the largest of the nine held in Chicago. Its size can be estimated on the basis of the space that is required for its production. According to W. H. Eisenman, managing director of the annual event, 263,000 sq ft of space in the Amphitheatre at 42nd and Halsted streets are to be utilized for exhibit purposes. This represents over six acres devoted to the showing of new products, new processes, new developments and new services. There will be a diversity of interests represented, ranging from new spot welders to the latest in testing and finishing equipment. Exhibit spaces will also vary widely in size, ranging from a minimum of 100 sq ft up to as much as 3,800 sq ft.

In these troubled times, national security depends to a large extent upon our technological advances, nowhere more important than in the field of metals. The annual Metal Show provides assurance that we have the know-how and the facilities for keeping America free and protected. It also serves to bring together the experience, the knowledge and the means for a more effective use of metals in the making of products for both defense and civilian use.

Participating in the 1954 Metal Show are four technical societies directly concerned with the advancement of science and engineering in the metals industry. These societies and their headquarters hotels are:

American Society for Metals, Palmer House.

American Welding Society, Hotel Sherman.

Institute of Metals Division, AIME, Morrison Hotel.

Society for Non-Destructive Testing, Morrison Hotel.

Technical programs of these societies will be conducted at their respective hotels. For further information on the Welding Society program see page 33, this issue. Beginning Monday, November 1, the American Society for Metals and the American Welding Society will hold morning, afternoon and evening technical sessions in meetings at their headquarters hotels. The Institute of Metals Division, AIME, will hold daily and evening technical sessions beginning Monday and continuing through Wednesday. The Society for Non-Destructive Testing will hold morning and afternoon sessions Monday through Friday.

### For Early Arrivals

On Saturday and Sunday, October 30 and 31, the American Society for Metals will hold its annual preshow seminar, which will have both morning and afternoon sessions. The subject of the 1954 Seminar is "Imperfections and Impurities."

The American Society for Metals will also hold its annual metallographic exhibit during the entire week of November 1 to 5. Micrographs and macrographs displayed in this metallographic exhibit will qualify their owners in a contest for substantial recognition as well as a cash award for the best entry.

The annual meeting of the American Society for Metals will be held on Wednesday morning, November 3, in the grand ball room of the Palmer House. The annual banquet of the American Society for Metals will take place on Thursday evening.

Managing sponsor of the 36th National Metal Congress and Exposition is the American Society for Metals. Managing director of both events is W. H. Eisenman; assistant director of the National Metal Exposition, Chester L. Wells. Headquarters for the operations of both the Metal Congress and Metal Exposition are at 7301 Euclid Avenue, Cleveland 3. Chicago headquarters will be at the Palmer House, Chicago.

# Safe ways to weld

## (and other containers

## Like This

The rules are here! You must know them, but that is not enough. You must follow them with an almost religious fervor. Any backsliding may mean your life.

BY CLYDE B. CLASON

A LETTER to the editor, appearing in WELDING ENGINEER a year ago, described the experience of its writer with a supposedly empty gasoline drum. The drum had stood for four or five years in a corner of a garage with its caps off. It was decided to weld a ½-in. coupling on the side. The weldor sniffed and could detect no odor of gasoline inside. He called another man to verify the nose test. The second man sniffed and could not smell gasoline either. The drum was deemed safe for welding. Fortunately, it was moved outside before welding began. At the first touch of the arc, the tank exploded!

This little incident shows what the weldor is up against when he is given a job to do on an empty (?) gasoline tank or other container that has held combustibles. Nevertheless, such tanks and containers can be welded in perfect safety and are being so welded every day. But you must know the rules and follow them with religious fervor.

All of the rules are printed in a little paper-bound pamphlet, AWS Standard A6.0-52, "Safe Practices for Welding and Cutting Containers that Have Held Combustibles." If you don't have this booklet, order it immediately from the American Welding Society, 33 West 39th St., New York 18, N. Y. It will be the biggest 50c worth you ever received.

Flammable and explosive substances may be present in a container if it has previously held any of these:

(*a*) Gasoline, light oil or other volatile liquid that releases potentially hazardous vapors at atmospheric pressure.

(*b*) An acid that reacts with metals to produce hydrogen.

(*c*) A non-volatile oil or solid that will release potentially hazardous vapors, not at ordinary temperature but if the container is exposed to heat.

(*d*) A combustible solid, finely divided particles of which may still be present in the form of an explosive cloud.

If you know what substance the container has previously held, but but don't know whether it is combustible or not, consult a chemisty textbook before you start any welding. Ignorance is a poor excuse for an explosion.

Combustible substances, whether solids, liquids or gases, may be divided into two types: (1) those that are soluble in water and (2) those that are not soluble in water. This distinction is of the utmost importance for cleaning purposes. Again consult the chemistry textbook if you don't know whether a substance is soluble in water or not.

If you don't know and can't find out what substance was in the container previously, play it safe. Assume that it held something that was: (*a*) flammable and (*b*) not soluble in water. Follow the proper cleaning procedure for those two conditions, and you will live for a long time yet.

Why is the distinction between water-soluble and non-water soluble substances of so much importance? Just this: a water-soluble substance can be completely removed by filling the container with water and draining it several times. But you can't flush out a non-water-soluble substance, like oil or gasoline, in that simple way. Innumerable fillings and drainings may not remove the danger.

Gasoline tanks for cars, gasoline truck tanks and ground tanks, fuel tanks for domestic heating or any other vessel that has held oil or gasoline must be cleaned by either a hot chemical solution or by steam (both methods will be detailed later) and even then it may not be wholly safe for welding. To make absolutely sure, the cleaning should also be supplemented by filling the container with water or by using an inert gas before and during the work.

### Seven Safety Rules

If you expect to be doing any welding or cutting on old tanks, type out the seven rules given below and paste them on a wall of your shop. Make sure that everybody who will have anything to do with such work knows them by heart. Here are the rules:

(1) Clean the tank. The cleaning procedure must depend on whether the tank has held a water-soluble or a non-water-soluble substance. If you don't know, assume that the substance was not soluble in water and proceed accordingly.

(2) Clean container in the open if you can. If it must be cleaned indoors, make sure that the room is well ventilated.

(3) If the container has held a toxic gas, or a substance that might result in a toxic gas being formed during cleaning, make sure that the men doing the cleaning are protected against harmful exposure, either by adequate ventilation or, in extreme cases, by oxygen masks.

# gasoline tanks

## that have held combustibles)

(4) Cleaning chemicals are not gentle in their action. The human beings who handle them must be protected by suitable goggles, gloves and other safety clothing.

(5) Disconnect or remove from the vicinity of the container all sources of ignition before cleaning is started.

(6) In a container that has two or more compartments, treat each compartment in the same manner, regardless of which is to be welded or cut. Impartiality will pay dividends in safety. Favoritism may lead to an explosion.

(7) After the container has been cleaned, tested and is ready for welding or cutting, stencil or tag it. The stencil or tag should include a phrase like "Safe for welding and cutting," the signature of the person so certifying and the date.

METHODS OF CLEANING

*Water cleaning:* The simplest method of cleaning is, of course, to flush out the container with water. As stated, this method is allowable only when the container is known to have held a water-soluble substance. A water-soluble acid is one example. Acetone and alcohol are others.

*Chemical cleaning:* For gasoline or oil tanks, a hot chemical solution is necessary. The chemicals generally used are compounds of sodium silicate or trisodium phosphate (strong washing powder), dissolved in water.

Here is the proper procedure for the hot chemical solution method of cleaning:

Close all openings except drain and filling connections or vent. Seal cracks or other damaged sections with damp asbestos, damp wood flour or similar material.

Fill the container to overflowing with water, preferably letting the water in through the drain. If there is no drain, flush the container by inserting the hose through the filling connection or vent. Lead the hose to the bottom of the container to get agitation from the bottom upward. This will cause any remaining liquid, scum or sludge to be carried upward and out.

Drain the container.

Dissolve the amount of chemical required in a little hot water (boiling water, if possible). Use from two to four ounces of chemical per gallon or water; *i.e., a* 5-gallon container will need between 10 and 20 ounces. Pour the solution into the container and then fill it with water.

Make a connection to the container to admit steam into the chemical solution. Use either the drain or a pipe leading to the bottom of the container, for the reasons previously stated. Using steam, maintain the solution at a temperature of 170 to 190 F for at least 15 to 20 minutes. At intervals during the steaming, add enough water to overflow container and discharge any volatile liquid, scum or sludge collected at the top. Continue steaming until you reach the point when no appreciable amount of scum or sludge shows up at the top of the container.

Drain the container and inspect the inside to see if it's clean. Use a mirror to reflect light into the container and an electric lantern or flashlight of a type approved for location where flammable vapors are present. Do not use a match.

If the container doesn't look clean, you will have to pour in a second dose of chemical solution and steam it all over again. If it is clean, you are ready for the next step.

Close all container openings and leave them closed for 15 minutes. Then reopen the container and test a sample of the gas in it with the aid of either a combustible gas indicator or the Larner gas sampler apparatus. There are several makes of combustible gas indicators that are commercially available. More will be told about the Larner apparatus later on.

If the sample of atmosphere taken from the container is below the lower limit of flammability, as determined by test, your troubles are over. Weld

## Not Like This

or cut on the container to your heart's content. If the concentration of flammable vapor in the sample is not below the lower limit of flammability, then you'll have to keep on cleaning the container until it is.

If you do not have steam to heat the chemical solution in the container, you can use a cold-water solution, though this is less effective and may necessitate more cleanings to arrive at the safety level. With cold water, increase the amount of cleaning compound to about 6 ounces per gallon of water and agitate the solution either by rolling the container or by blowing air through the solution by means of an air line inserted into an inlet near the bottom of the container.

*Steam cleaning:* Though the hot chemical solution method of cleaning makes use of steam, it is not considered as steam cleaning. The steam cleaning method is altogether different. Here is the procedure:

Prepare a solution of hot soda or soda ash (1 lb of chemical to a gallon of water) and fill the container at least 25% full. Agitate sufficiently to insure that the inside surfaces are thoroughly flushed. Then drain container.

Close all openings in the container except for drain and filling connection or vent. Seal cracks or damaged sections with damp asbestos tor damp wood flour.

Make steam connections. Steam hose should not be less than ¾ in. in

diameter, without a valve at the outlet end. Control the steam pressure by valve ahead of the hose. Use low-pressure steam for cleaning.

If a metal nozzle is to be used at the end of the hose that enters the container, it should be of a non-sparking material and should be electrically connected to the container. The container, in turn, should be grounded to prevent any accumulation of static electricity.

Blow steam into the container, preferably through the drain. When a container has only one opening, position it so the condensate will drain from the same opening into which the steam hose is inserted. Continue steaming until the container is free from odors and has been brought to such a temperature that steam vapors flow freely out of the vent. It may take several hours before steam will flow freely from the outlet of the container. Do not set any definite time limit as rain or cold weather may condense the steam as fast as it is introduced.

After container has been brought to the proper condition of steaming, flush it throughly on the inside with hot water, preferably boiling water. Drain and inspect inside with a mirror. Again use only an electric lantern or flashlight approved for locations where flammable vapors are present.

Close container openings, reopen after 15 minutes and test container atmosphere for flammability as explained previously.

### To Make Sure—

It never hurts to be overcautious when dealing with anything so dangerous as flammable vapors. To make assurance doubly sure, you can fill the container during welding or cutting with either water or water plus an inert gas. But do not do this as a substitute for cleaning, which is always necessary.

If you plan to use water only inside the container, place it so that it can be kept filled to within a few inches of the point where the welding or cutting is to be done. Make sure that the space above the water level is vented to allow the heated air to escape.

As an alternative to water filling, the container can be filled with an inert gas. The permissible gases are nitrogen and carbon dioxide. Nitrogen is available in cylinders and carbon dioxide either in cylinders or in the form of cakes of dry ice. (Do not confuse carbon dioxide with carbon monoxide, which is highly dangerous. And do not use a gasoline engine exhaust, which produces carbon monoxide.)

The principle behind the use of an inert gas is that flammable gases and vapors will be diluted and so rendered non-flammable. To effect this, a minimum concentration of 50% is required for carbon dioxide. If the flammable vapor is principally hydrogen, carbon monoxide or acetylene, a minimum concentration of 80% is required. Nitrogen concentrations should be at least 10% greater than the concentrations specified for carbon dioxide.

Obviously, it is going to take a lot of gas to fill a good-size container, so cut down the volume of gas by filling as much of the container as you possibly can with water, which is cheap. Then you must calculate the volume of the space above the water level and add enough gas so that the space will have at least the minimum concentration for non-flammability.

With carbon dioxide or nitrogen cylinders, introduce the inert gas into the container at low pressure (about 5 psi) through the drain. If the water level is above the drain connection, introduce the inert gas through the filling opening or vent and extend the hose to the bottom of the container or at least to the water level.

To estimate the volume of gas withdrawn from the cylinder, weigh the cylinder before and after withdrawal. Then multiply the number of pounds lost by 8.7 to get the number of cubic feet if carbon dioxide is the gas withdrawn or by 13.8 to get the number of cubic feet if the gas is nitrogen.

If you are using solid carbon dioxide, you must remember that one pound of dry ice will produce 8.7 cu ft of gas. Crush the cakes and distribute the particles evenly over the greatest possible area.

### Is It Safe Yet?

There are three methods of determining whether or not enough carbon dioxide or nitrogen is present to render the atmosphere of the container non-flammable.

1. Use a combustible gas indicator.
2. Use an Orsat or similar gas analysis apparatus (for carbon dioxide only).
3. Use the Larner gas sampler.

The Larner gas sampler is illustrated and the procedure described in the appendix to the American Welding Society's Standard A6.0-52, previously referred to. It is a Rube Goldbergish looking piece of apparatus that makes use of a football bladder and a rubber bulb pump. Samples of atmosphere are withdrawn from the container—from both bottom and top—and tested for flammability by allowing the gas to escape into a torch flame (which must be at a distance from the container, of course). If the escaping gas exhibits a tendency to deflect or to blow out the flame, it may be considered to be non-flammable and non-explosive and it is safe to allow welding, cutting or other hot work to be done on the container.

If the gas escaping from the football bladder displays a tendency to ignite or if flashback explosions occur, the gas content of the container must be considered flammable, and the container is unsafe for welding or cutting. Add more inert gas or go back and clean the container all over.

## BRONZE GIANTS OF IWO JIMA

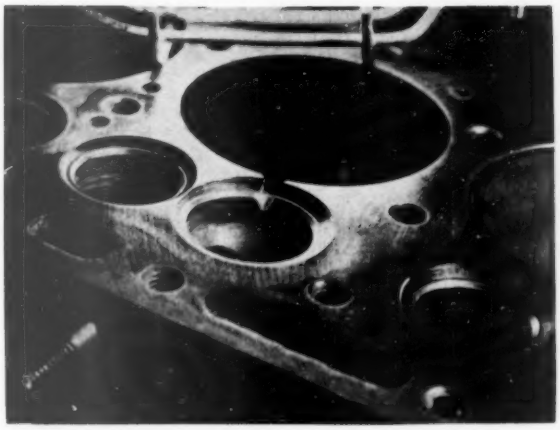
*(Continued from page 38)*

At the foundry, each piece was cast in bronze, cleaned with nitric acid and chiseled to final exact contour by expert artisans working under the direction of Mr. de Weldon. The surface was then refinished, and a strong bronze framework was built as support on the inside of the statue.

The major portion of the funds for the Memorial were raised under the direction of the Marine Corps War Memorial Foundation, Inc. Total cost is expected to be three-quarters of a million dollars. Nearly half a million dollars has been raised so far, nearly all of it donated by marines and former marines. A final drive to raise the remaining $250,000 will be launched shortly.

The Memorial is dedicated to all marines who have given their lives since 1775. Its 10-ft base of Swedish black granite will list the place and date of every Marine Corps engagement since the 1775 founding date. Also on the base will be inscribed former Fleet Admiral Chester Nimitz's tribute to the Marine Corps at Iwo Jima:

"Uncommon valor was a common virtue."



FIRST step in a block repair is to file or grind the crack

WELDING completed. Note the bolt head in valve port

# How to weld a cracked block

**BY HOWARD LONG**
*General Electric Co., Seattle*

REPAIRING of a cracked cylinder block is a job most weldors hate to tackle. They know it often proves to be a bigger job than the first glance indicates.

As an example of the proper procedure, I ran across an engine in a 1951 car with a cracked block. An overheated engine, caused by a sticking exhaust valve, had resulted in a crack in the valve seat. The crack extended into the water jacket and down the cylinder wall for about 1½ in. It was sufficiently serious to mean that the block would have to be junked unless the break could be welded. Because the crack was so short, however, a simple repair procedure was possible.

Generally, it is wise to begin by drilling a small hole at each end of the crack to prevent further cracking. In this case, however, that did not seem necessary. Instead the crack was filed out to its full depth on the surface (left picture). After this preparation, the block was preheated with infrared heat lamps for three hours. The lamps gave a good preheat.

The machined surfaces, cylinder walls and the top of the piston were covered with asbestos sheet to retain the preheat and provide protection from spatter. A large bolt head was placed inside the cracked valve port —both to protect it and to provide a "starting tab" for striking the electrode.

The welding was done with a nickel-base electrode. A 3/32-in. electrode was used for the first pass, a ⅛-in. electrode for the following passes. After each pass, the deposited metal was peened thoroughly with a light slagging hammer. To be most effective, the peening should be done before the metal has a chance to cool. The appearance of the finished welding job is shown in the picture at right.

The job was completed by surface grinding of the weld. To insure uniformity of wear for the valve seat, an insert ring was installed. This avoided the likelihood of trouble from valve action on a hard nickel deposit and softer cast iron; it also afforded an opportunity to test the machinability of the weld. There were no hard spots.

Since this welding job was done, the owner reports that the engine has given carefree service for over 8,000 miles.

When welding cracks on the outside of the block, to repair water jacket leaks, the eight rules given below should prove helpful:

## 8 rules for a better job

**1. Vee out the crack. You can use a round-nosed chisel, a grinding wheel of a small radius or a rotary file chucked in a drill. Don't make vee too deep.**

**2. Leave a small land on the thin-walled cast iron so the two edges can hold the section in a fixed position while the hot weld metal cools and shrinks. The heat-affected zone may be a bit weakened and should not have to endure unnecessary tension.**

**3. Drill "stopper" holes at each end of the crack.**

**4. Preheat. If no other means of preheat is available, run the engine for a few minutes prior to welding.**

**5. Weld from the ends toward the middle. Weld about an inch at a time and let the heat dissipate between passes.**

**6. Use a moderately low heat. Carry the arc on the deposited metal as much as possible.**

**7. To avoid annoyance of crater cracks, don't "snap out" the arc on the casting without first drawing back over the weld deposit half an inch. Reduce the puddle size at the same time.**

**8. Don't hurry that last inch. No use being careful in the early stages if you are going to get too much heat and expansion on the last section.**

**CONVENTIONAL** materials of brick, etc., cover the framework and hide all evidence of a startingly new design

# This new home wasn't

Some 1,200 welds help to make a steel-framed house of unusual strength and durability. The pipe framework is also the heating and cooling system.

**WHEN** Owner Wagner pulls on these half couplings with a big wrench, the whole house can be raised or lowered to counteract the effects of settling

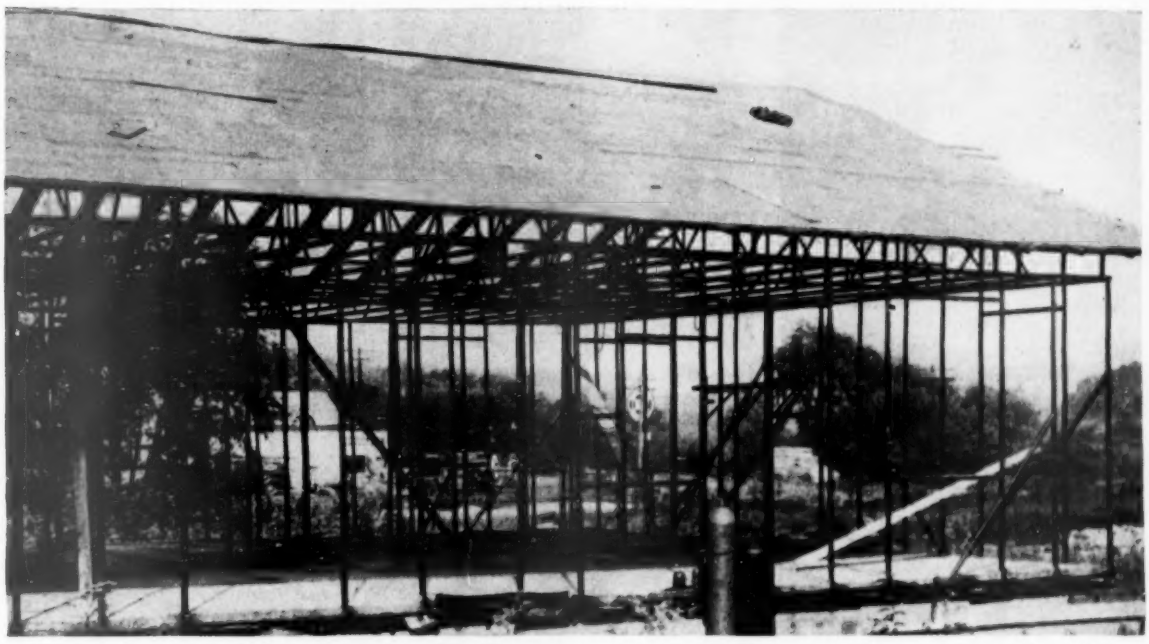
BY HARRY J. MILLER

JOHNSTOWN, Pa., once made history as the site of a certain flood. Had John F. Wagner's ideas on the proved strength of welding been known and applied in that far-off era, perhaps the toll exacted by the raging waters might have been only a fraction of the damage.

This modern Johnstown citizen, a welding and pipe foreman, has built a house of welded steel pipe. Tubular members form the joists, the roof rafters, the studding and the heating system (which also doubles to cool the house, via reverse-cycle refrigeration, with water taken from an adjacent well).

Wagner spent close to $300 for oxygen and acetylene, plus about $60 for welding rods to make the total 1,200 welds in the pipe framework. There are 400 welds in the heating system alone.

The young builder estimates that he installed about 560 ft of 1½-in. black steel pipe, 4,100 ft of 1¼-in., 560 ft of 1-in. and close to 500 ft of ¾-in. pipe. He figures that his welded pipe framework will withstand a load of 6,500 lb and insists that his home will not only be fireproof but also



**BUT here we see it under construction. Hundreds of feet of pipe are joined into a complex framework by welding**

# any pipe dream

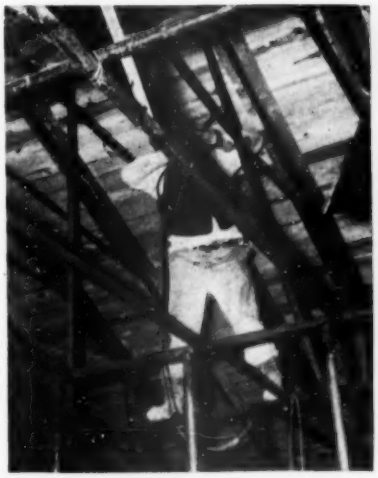
termite and rodent-proof. The only wood in its construction is that used as a base for the roof shingles!

Engineers who have viewed the home aren't disposed to belittle his claims. And local and state building inspectors have approved this novel construction.

A HOME FOR $5,000

Wagner finds it a little difficult to estimate the number of hours that he spent in cutting and welding pipe. No exact records were kept because this was a spare-time and vacation sort of job, financed out of current earnings. Though construction had to be extended over a long period, Wagner is positive that its cost, exclusive of his labor, did not exceed $5,000. And the proved costs indicate a comfortable margin downwards as compared with conventional housing.

If additional advantages are needed, the Wagner house bears every evidence of being able to withstand greater pressures, weights and wind velocities than homes of conventional construction. It will also stand up better under atomic bombing—though the homeowner derives little comfort from thinking of that.



**PIPES support the ceiling and also serve for radiant heating**

**PIPE carries the inner walls and frames all doors and windows**

There are many innovations to adapt interior finishing to the welded pipe framework. For example, sheets of insulating board are attached to the pipe risers by means of studs that were gun welded to the pipes. The insulation board fits over these studs and is held fast with washers and nuts fitting over the threaded ends of the studs.

A layer of rock wool fill is introduced between the insulation board and the brick exterior wall. To form the ceilings, wire lath is fastened to the upper pipe struts and plastered. The interior walls of the 31 by 41 ft home received similar treatment.

Wagner has really let himself go in the basement, which contains 40 support stanchions of 2-in. pipe resting on steel plates 14 by 14½ in. These

**STRAPIRON clamps help hold insulation board to a pipe riser**

**BRICK facing on concrete footing allows 2-in. "dead air" space**

**CINDER blocks bonded to pipe form a room for the heating unit**

plates are sunk in a 10-in.-deep concrete flooring. Not designed for living purposes, the basement is only 3 ft deep. However, it serves admirably to support the pipe framework so that no part of the building will touch ground.

### Can Be Raised or Lowered

A novel feature of the basement supports is that Wagner can raise or lower the house wherever and whenever such compensation may be indicated. Within the 2-in.-pipe uprights that support the floor joists are lengths of 1½-in. pipe. These are threaded part way down from their tops and carry a nut made from half of a 1½-in. pipe coupling. By turning up or down on these half-coupling nuts, the house is raised or lowered.

The 2-in. pipe stanchions are stationed around the basement on 4-ft centers. The threads on their 1½-in. raising and lowering pipes constitute the only threaded joints in the entire pipe system. With floor joists spaced 24 in. apart, the entire building can be raised from 3 to 4 in.

Supporting the ceiling structure is a combination of ¾-in. and 1-in. pipes. Ribs applied like concrete on top of brick ties, at intervals of 14 in. on the building's elevation, cancel flue action between the insulation board and the brick by providing an additional dead air space.

### Pipe Heating System

The pipe framework provides a heating system in which all of the heat-exchange components are positioned outside of the occupancy space. The pipes that permeate the walls, ceilings and floors, perform the dual function of heat radiators and structural supports. Naturally the water used to accomplish reverse-cycle refrigeration is periodically tested to make sure it is free of impurities, which could prove corrosive to the pipelines.

To allow for expansion of the entire system, a Y-shaped master feed and expansion joint permits movement of the lines sufficiently to relieve undue strain, while the pipes in the basement serve as an expansion tank. A pressure of 10 psi carries the heating load, although the entire system has proved its ability to stand a continuous pressure of 50 psi.

Because the heat exchange between the interior space and the heating or cooling pipes is effected over large surfaces having relatively low temperature differences (as contrasted with conventional systems where radiators or cooling coils have high temperature differences), there is small fear that the pipes will "sweat" and that such moisture will penetrate wall surfaces.

A lower boiler temperature in the Wagner system makes for greater fuel efficiency in burning liquid or gaseous fuels. Further fuel economies are inherent in this welded structure, since lower temperatures of air can be maintained throughout the building without personal sense of discomfort.

Cooling of the building can be accomplished with relatively high temperatures. This is achieved by dissipating heat into the ground by means of welded pipe coils buried therein.

Since the welded pipe warms the walls, floors and ceiling, there is a winter comfort in this home impossible to attain otherwise. As the heating elements are within insulation or masonry, their oxidization is reduced to a minimum. And the fluid held safely inside the pipe system by welded joints will circulate without need for future replenishments.

Each of the four heating zones is controlled by a valve thermostat, which shuts off the heat from its particular area at the predetermined temperature setting. Different temperatures can thus be had in different parts of the house.

Only welding could have made possible the heating economy and high degree of comfort that Wagner secures in the subzero winter temperatures of Johnstown.

Despite the mockery of friends and neighbors—mockery that seems to be the inevitable lot of trail breakers—everything worked out the way that Wagner had planned it. Once the pipework was welded together, a floor of concrete was embedded in a web of steel. The steel was welded to the pipes that form the floor joists. Nailing strips to carry the floor boards were anchored in the concrete's upper surface.

Prepared even for atomic attack, Wagner says: "Welding has provided my house with unequalled strength, and I can flush the entire building of particles of radioactive deposits that may penetrate the walls."

But he's hoping that day will never roll around. So are the rest of us.

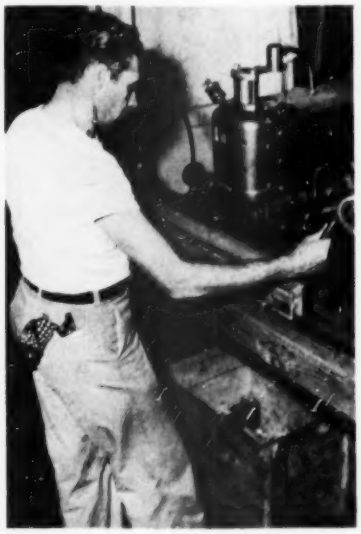
LARGEST and smallest bellows made by Circle Weld appear in the center

# Problem: To make these bellows

"To this day we don't know exactly why we got what we wanted," say Yeakel and Breaux. "And we are afraid to ask the theorists because they might convince us that the whole thing is impossible."

BY THOMAS A. DICKINSON

MASKING tape holds the ends of the thin stainless sheet together



TAPE is progressively removed as the thin-wall tube is seam welded

Y. T. Yeakel and A. E. Breaux, who own Circle Weld Co., Inc., at Burbank, Calif., encountered what seemed to be an unsolvable problem when they decided to investigate the possibility of manufacturing stainless-steel bellows for the aircraft industry.

The problem was tough because:

(*a*) The required bellows had to be made from stainless-steel sheets 0.002 to 0.016 in. thick.

(*b*) Tubes made from the sheets had to have weld joints that would remain leakproof following severe forming operations.

(*c*) More than two parts with different thicknesses had to be assembled in certain areas of the bellows.

Yeakel and Breaux first tried inert-gas welding. The resulting joints had good penetration and minimum oxidation, but it proved impossible to control fusion welding temperatures with enough precision. The tubing seams did not have good enough ductility to withstand severe hydraulic forming operations.

The two men turned their attention to the possibility of using resistance-welding equipment. But while they could control the heat output easily enough, they found they couldn't produce enough heat to join the materials without damage to the ultrathin stainless sheets.

A careful study convinced them that this difficulty was primarily the result of arcing. The reason for the arcing was that the voltage was too high for the thin material. Carrying it on from there, they found that to accomplish their objective, they would need resistance welders capable of producing 6,000 to 7,000 amperes with an electromotive force of only 1½ volts. Such welders simply weren't on the market.

Yeakel and Breaux—a pair of extremely determined fellows, as you may have guessed—began experimenting with coils and multiple transformers, hoping it would be possible for them to build their own equipment.

### Don't Know Why It Works

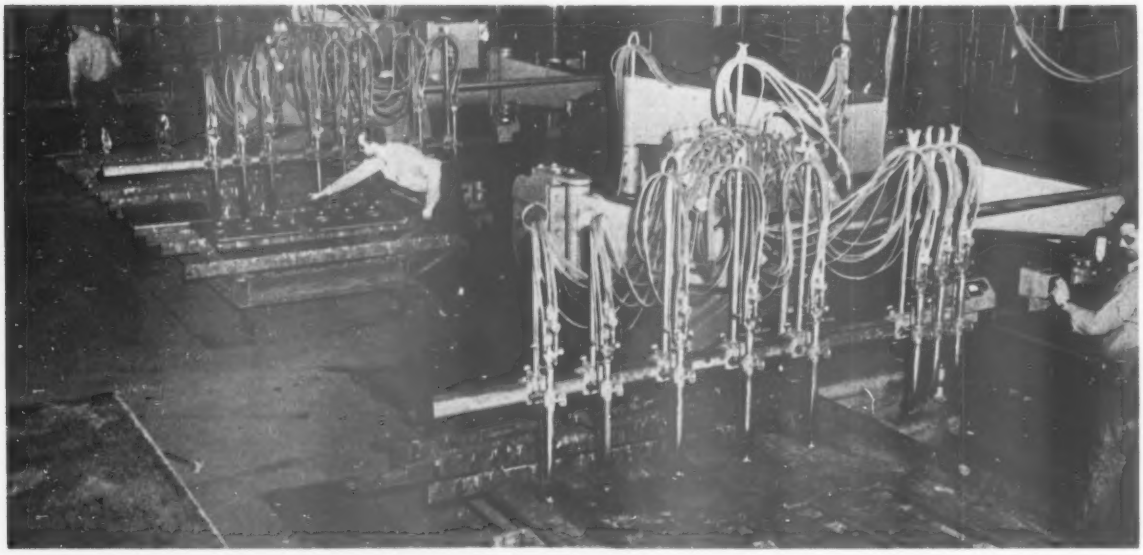
"We tried all of the logical methods of producing the current we required," Yeakel says, "and they didn't work. Then—a little desperate, I guess—we attempted the impossible. To this day, we don't know exactly

*(Continued on page 53)*

1—DRAFTSMAN prepares a silhouette template. This outline of a part is all that is needed for cutting

# Cutting up steel at Yale & Towne

From a template on a drawing board to a finished lift truck—the pictures tell the story. Interesting points: The three pantograph-type machines travel an 84-ft track and can cut to 1/16-in overall tolerance.



4—THREE huge machines in a row will flame-cut the parts to tolerances of 1/32 in. plus or minus, 1/16 in. overall

THE materials handling division of Yale & Towne Mfg. Co., located in northeast Philadelphia, is famous for an extensive line of hand lift trucks, motorized hand lift trucks, gas and electric industrial trucks, hand chain hoists, electric hoists, etc.

### Multiple Flame-Cutting

The most modern production methods are used to turn out this materials-handling equipment. Of particular interest to the readers of this publication is the set-up for multiple flame-cutting.

The cutting is accomplished by three mobile flame-cutting machines of the pantograph type, which travel on 84 ft of rail. Each of the three machines is equipped with eight cutting torches and a complement of tracing devices—manual, magnetic and electronic—to enable various shapes to be flame-cut to precision tolerances.

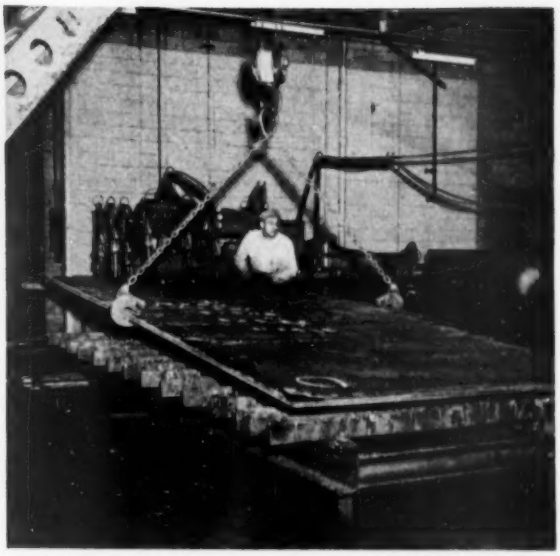
The ability of the machine to cut to such close tolerances as 1/32 in. plus or minus, 1/16 in. overall, reduces grinding to a minimum. Most pieces are welded as cut. Machining is necessary only on parts requiring extremely close fit-up.

### Pictures Tell It All

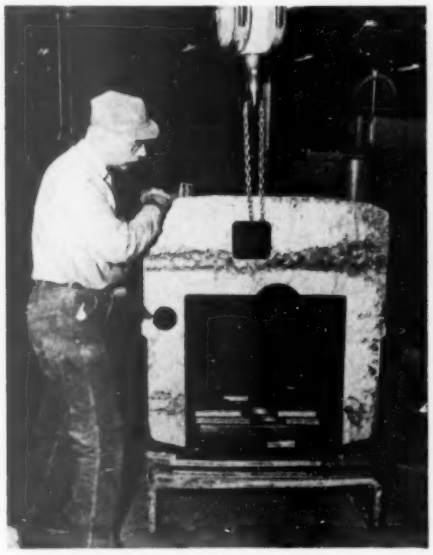
The accompanying pictures tell the full story. In photo 1, a draftsman is preparing a template—a black-and-white silhouette—for electronic tracing. The electronic tracing head (photo 2) follows the outline of this template. To keep the paper template clean, it is kept under plexiglass, which makes no difference to the tracer.

In preparation for shape cutting,

2—TEMPLATE may be as intricate as you wish; the electronic tracer will be able to follow it exactly



3—RAW material comes next. Crane hoist is placeing a 1-in. plate on table in preparation for cutting



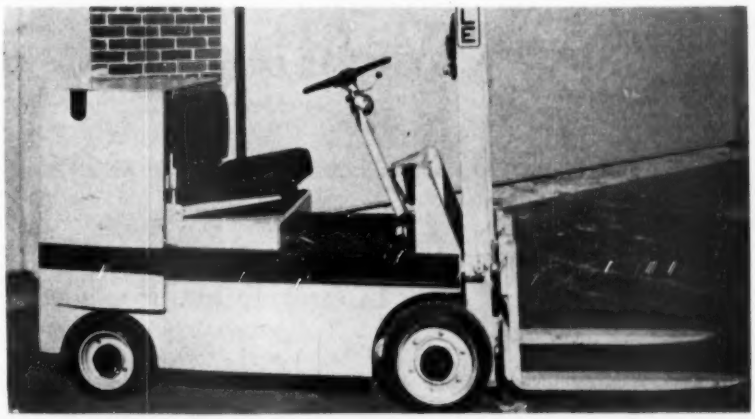
5—JUST cut: a fork truck back plate

6—MANY different parts cut from 1040 steel. Note absence of slag

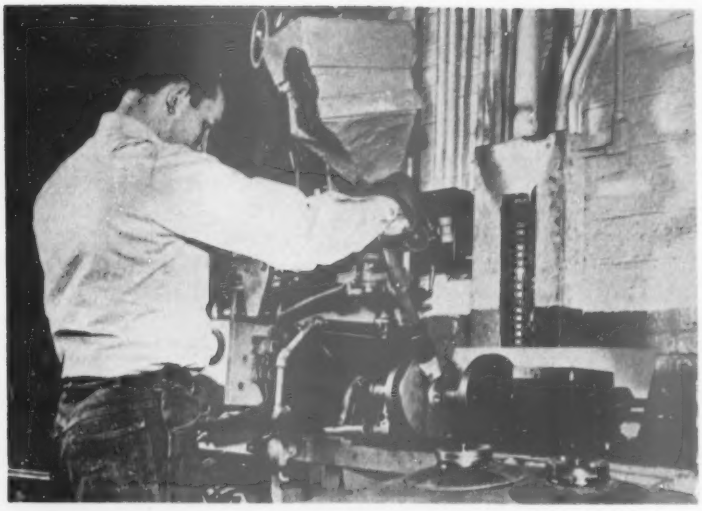
the crane hoist places a 1-in. steel plate on the cutting table (photo 3). In photo 4, we see the full battery of three flame-cutting machines. Magnetic and manual tracers are employed when straight-line cutting is to be done.

The cut parts are notable for the absence of slag. The part in photo 5 is a precision-cut back plate for a fork truck, while photo 6 shows a variety of parts that were cut from 1040 steel. In photo 7 we see a completed lift truck.

*Photos courtesy Air Reduction Sales Co.*

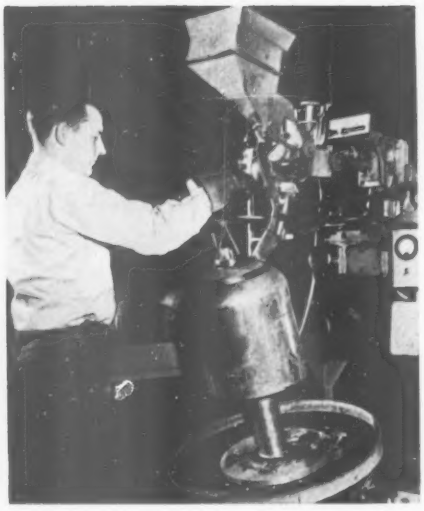


7—FINISHED lift truck does credit to streamlined cutting operations



Acetylene

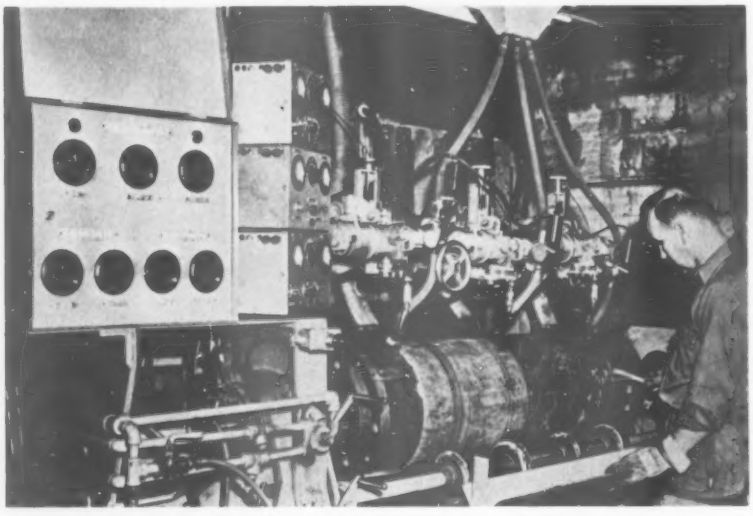
1—CIRCUMFERENTIAL butt joins a spud to flange to form an acetylene cylinder assembly



2—ANOTHER head welds the flange assembly to the top of the cylinder shell

Propane

5—SPUD goes on top of cylinder



6—THREE-HEADED submerged-arc welder welds together the four outer sections of a 100-lb propane cylinder. See the text for more information

# Welding the cylinders that

The postman on holiday is reputed to take a long walk, while the bus driver goes on a bus ride. So it seems fitting that a plant producing pressure cylinders for welding gases should make an extensive use of welding.

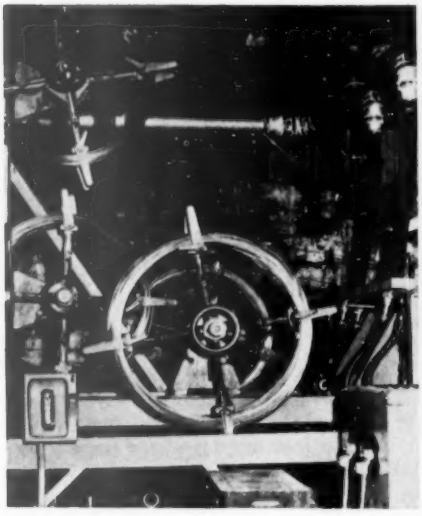
A LITTLE less than 50 years ago the first acetylene headlight was installed on a "horseless carriage." This welcome aid to motorists was fed acetylene gas from a small cylinder attached to the side of the automobile. The "Prest-O-Lite" carbide system was universal automobile equipment for many years.

Although automobile-lighting cylinders have gone the way of driving dusters and goggles, the Prest-O-Lite factory in Speedway,* Ind., is bigger

*The name "Speedway" reminds us of the classic 500-mile Memorial Day auto races. The Presto-Lite factory is just across the street from the Indianapolis Motor Speedway, and there is a long and close connection between them.

3—SAME operator lays boss welds on the bottom end of the acetylene cylinder

4—BOTTOM and top shells of cylinder. Bottom (left) has received boss welds and top (right) the welds that join spud and spud flange



7—HERE are the four reels that feed wire to the three-headed welding machine

8—CENTER welding head is raised above working position to show two electrodes. These fuse more metal for a circumferential weld

# will hold welding gases

than ever. It is turning out thousands of steel cylinders a year, many of which are used for welding. The Prest-O-Lite factory functions as a part of the Linde Air Products Co., a division of Union Carbide and Carbon Corp., and a large portion of its production is devoted to acetylene cylinders. The factory has also become a major supplier of cylinders for propane, butane.

Even though oxyacetylene welding and cutting are highly important, an even larger market for cylinders probably lies in the liquefied petroleum gas industry. Propane is most commonly handled in cylinders holding 20 lb and 100 lb, approximately 11¾ to 14½ in. in diameter by 15 to 45 in. long. The producers ship propane in tank cars to filling stations, where the cylinders are filled and passed on to distributors. Some of the larger producers of propane buy cylinders for the filling stations; in other cases the filling station companies buy cylinders for this service.

Acetylene is shipped in cylinders that have been filled with a porous material. As every reader knows, the fine pores are saturated with acetone, which holds the gas in solution. Acetylene cylinders are made in capacities

of 10 cu ft, 40 cu ft, 60 cu ft, 100 cu ft and 300 cu ft.

Cylinders for refrigerant gases such as freon, sulphur dioxide and methyl chloride are also manufactured at Speedway. The cylinders for this group of gases are, in general, interchangeable. The manufacturers or producers of these gases purchase quantities of cylinders ranging in size from 50-lb to 150-lb capacity for distribution to jobbers and to large users of refrigerants such as manufacturers of refrigerating and air-conditioning equipment. Distributors and jobbers of the refrigerant gases may also purchase smaller cylinders, ranging in capacity from 5 to 50 lb, which are used by repair men in servicing equipment in the field. The demand for the 5-lb cylinder is particularly large because under normal conditions a new gas should be added to a refrigeration system every 5 to 6 years.

Cylinders for anhydrous ammonia, chlorine and hydrogen sulphide are manufactured in capacities varying between 10 and 150 lb. These gases are used in the chemical industry; ammonia also in commercial refrigeration and for soil fertilization.

Crucibles for heat treating, carburizing, melting of low-temperature alloys, etc. are also manufactured at Speedway, using many of the production techniques employed for cylinders. Crucibles differ in use from cylinders in that they are open containers—carburizing pots, heat-treating vessels, etc.—and consequently are normally manufactured with a flat bottom. A flange is formed around the top to promote ease of handling. Crucibles regularly manufactured range in diameter from 6 to 18 in. and have a normal height or length of from one to two times the diameter. The wall thicknesses run up to approximately 5/16 in.

Facilities are available for manufacturing shells for bombs, boosters, fire extinguishers, lagged drums and many more special deep-drawn containers. Again production techniques are similar to those for cylinders.

Production begins with cold drawing. The hydraulic presses are of the modern high-speed, long-stroke type and are capable of cold drawing steel circles almost 4 ft in diameter and up to approximately 5/16 in. thick. It is important that the steel as received from the mills be properly heat-treated so that cold working and subsequent heat treating can be performed. Constant checks are made on the material as received and during processing.

Most of the cylinders manufactured at the Prest-O-Lite factory are made from two cold-drawn shells, which are welded together circumferentially to form a center-joined cylinder. The welds are subjected to the most exacting tests in accordance with Interstate Commerce Commission regulations.

Testing of cylinders follows a threefold program: (1) materials are tested to check their conformance to the rigid chemical and physical requirements of the Interstate Commerce Commission or other regulatory bodies; (2) component parts are inspected for quality of workmanship at frequent stages of manufacture and assembly and (3) the completed cylinders are tested hydrostatically at two or three times service pressure. In most cases, air testing at normal service pressure is performed on all cylinders. Acetylene cylinders are also given a gas test to make certain that each cylinder functions perfectly both in receiving and in releasing a normal charge of acetylene.

## Acetylene

Major welding is done by submerged-arc automatic welding. Other welding of pressure vessels and deep-drawn shells and shapes can be done manually when necessary by qualified arc weldors.

A number of fixtures equipped with submerged-arc heads have been designed to enable the welding department to keep pace with the fast-moving production line. Some fixtures are set up in combination, permitting one man to operate two machines. Others operate with two and three heads. It is readily apparent to an observer that submerged-arc welding techniques have been perfected to a high degree.

Acetylene cylinders arrive at the welding department in the form of two cold-drawn steel shells with convex ends, a flange and a spud. The spud, which will later contain the valve, is welded to the flange in a lathelike fixture equipped with automatic welding head (photo 1). One circumferential weld joins the two pieces.

These welded units are delivered to the next welding point (photo 2), where an operator welds the spud-flange section to the dome of the top half of an acetylene cylinder. Welding head is in a stationary position with the work revolving below on an inclined turntable.

While the flange is being welded to the acetylene cylinder top shell, the same operator locks the bottom half into the welding fixture on his right. A water-cooled copper jig (photo 3) is placed on the convex end, which will be the base of the cylinder. Two submerged-arc welding heads are used to make a deposit about 8 in. apart on the cylinder, using holes in the jig as guides. These boss welds will later be drilled and tapped to receive safety plugs. The bosses (photo 4) are about ½ in. high and 1¼ in. wide and are deposited in 10 seconds. The welding rod is a mild-steel type.

With the welds on the top and bottom sections completed, the two sections are placed in another lathe-type fixture equipped with an automatic head. A weld over the joint joins the units into an all-welded cylinder.

## Propane

Welding specifications for the fabrication of propane cylinders call for automatic submerged-arc welding for all components. First step is the welding of a boss for a fusible safety device into the dome of each cylinder. Second operation is the welding of a threaded spud into the dome. Both of these jobs are done by a single operator on a combination set-up similar to that used to weld acetylene cylinders.

Boss welding is done on a machine equipped with two welding heads. The top half of a cylinder is clamped into place and capped with a block jig. Two holes in the block provide for a build-up of melted rod in the safety plug areas. These bosses will be drilled and tapped in a later operation. Since only one welded boss is required in the fabrication of a propane cylinder, only one head is used.

Now the same operator turns to his right and locks the boss-welded cylinder shell on a turntable fixture located under another welding head (photo 5). A cylindrical spud, which will later contain a valve, is placed in a stamped-out opening in the top of the cylinder shell. The top of the spud is flush with the surface of the shell. A circumferential weld joins the two

pieces as the assembly rotates under the welding nozzle.

### Three-Headed Machine

The two half-shell sections of propane cylinders are joined by a unique three-headed welder (photo 6), which is the latest contribution to submerged-arc welding at the Prest-O-Lite factory. It can simultaneously weld three joints on a single 100-lb propane cylinder. These welds, joining four component sections of a cylinder, formerly had to be made in three separate manual operations.

Each of the welding heads makes a different circumferential weld. Head number 1 tack welds a protecting ring to the top of the cylinder. Head number 2, with a twin-rod feed, makes a continuous weld joining the top and bottom shells forming the cylinder. Head number 3 makes a continuous weld between a foot ring and the bottom of the cylinder. Four reels (photo 7) feed welding rod through the three heads.

The four cylinder sections—valve-protecting ring, foot ring, top shell and bottom shell—are locked into a lathelike jig. Each head is actuated by its own voltage control box and a specially designed contactor unit. A single hopper feeds welding composition into each weld area.

Number 1 head, with a single electrode, places four 2-in. tack welds in a joint between the protecting ring and the top of the shell. Number 2 welding head (photo 8), equipped with two electrodes in tandem, joins the top and bottom sections of the cylinder. The increased deposit of the two rods enables the machine to make this weld in one pass, whereas formerly a single rod feed necessitated two passes for a satisfactory weld. This weld is made on the joint along the entire 48-in. circumference of the cylinder shells.

Number 3 head makes a continuous weld to join the foot ring to the bottom of the shell.

All welds produced by this machine are smooth and require no finishing. After final assembly, each cylinder is heat treated and is given hydrostatic and air-pressure tests similar to those given acetylene cylinders.

Most cylinders fabricated at the Prest-O-Lite factory are topped off by a valve cap. This is a cold-drawn shell with one convex end and an open threaded end. The latter fits over the valve spud, as a protective device.

A threaded ring is submerged-arc welded to the cap. The operation is performed on a small lathe-type fixture equipped with a welding head. The cap and ring are clamped into place and circumferentially welded together. No finishing is required.

### Refrigerant Cylinders

A sizable section of the welding department is geared to produce cylinders for refrigerant gases. Two circumferential welds made by two submerged-arc welding machines join prefabricated parts to form the rugged cylinder used by the refrigeration and air-conditioning industries.

Top and bottom cylinder shells with convex ends are cold drawn into shape. A hole is stamped out of the dome of the top half shell. This shell is placed atop an upright revolving spindle and beneath a welding head. A steel valve spud, which has been machined to receive a valve and protecting cap, is inserted in this opening and welded to the shell.

Top and bottom cylinder shells are clamped in a lathelike fixture beneath a stationary welding head. The top shell fits securely over the joint of the bottom section.

No finishing is required on the weld areas. The addition of a valve and protecting cap, plus a coat of paint completes the manufacture of a refrigerant cylinder.

A smaller but equally important section of the welding department concentrates its efforts on the welded fabrication of acetylene generators and ethylene oxide containers. Because of the relatively large sizes of these units, the welding machines and fixtures are designed for heavier duty.

An 8-ft-high stake welder is used to weld the longitudinal seams of the water tank of medium-pressure acetylene generators. Two sections of ¼-in. plate, rounded into half circles, are butted together and clamped at the top of the fixture. A welding head mounted on a carriage moves on a metal track along the length of the weld. One-pass welds join the plates.

Circumferential welds for acetylene generator water tanks and for ethylene oxide containers are made with the aid of turning rolls. The welding head remains stationary while the cylindrical tank is rotated. The welding head is mounted on a swiveling gantry, which can be raised or lowered to weld tanks of various diameters.

## PROBLEM: BELLOWS

*(Continued from page 47)*

why we got what we wanted. And we're afraid to ask the theorists to explain it because they might convince us that the whole thing is still impossible."

Yeakel and Breaux are naturally reluctant to disclose all details of their homemade resistance-welding equipment since they now have a competitive advantage and have been certified by the U. S. Air Force. However, they have revealed that their resistance-welding facilities comprise nothing other than single-phase, alternating-current machines with 10, 20, 45, and 65 kva ratings. You figure it out from that if you can.

The initial step in fabricating a bellows is to wrap the thin stainless-steel sheet around a mandrel. The mandrel is merely a round piece of wood, length and diameter depending, of course, on the dimensions of the tube. It is grooved to hold a copper bar that will serve as a lower electrode during the seam-welding operation.

Strips of masking tape are used to hold the edges of the steel sheet together and in proper alignment with the mandrel's copper bar, ends of which are attached to a pair of a-c terminals. As the tube is seam welded, the masking tape is progressively removed.

To serve as bellows, the tubes must be finned. The fins are hydraulically formed on the welded tubing in a more or less conventional manner (that is, much the same as if the bellows were being made with seamless tubing). Then valves, fittings and other attachments are spot and seam welded as necessary to the ends of the bellows.

Resistance-welding temperatures for all of the subject operations average about 2,200 F.

According to Breaux, the life of electrodes used by Circle Weld has been exceptionally long. Some trouble has been experienced, however, as the result of pick-up. The pick-up is said to be the result of atmospheric dust, which is relatively abundant in the Burbank area of Southern California during all but the rainy months of winter. However, the pick-up problem is expected to be remedied by an air-conditioning system, to be installed shortly.

1—PIPE coil, to be used for cooling a processing tank, is being welded. The oxyacetylene flame also helped to form the coil's turns

2—FLAME-CUTTING is done to install sight glass on an entrainment separator

# Construction and maintenance in a chemical plant*

BY C. W. WHITSON
*Carbide and Carbon Chemicals Co.*

OUR PLANT at Whiting, Ind., produces synthetic organic chemicals by the processing of petroleum gases from the neighboring oil refineries. Some of these products are ethyl alcohol, ethyl ether, isopropyl ether, isopropanol, acetone, ethylene oxide, ethylene glycol and acetylene.

The extreme temperatures and the many varied chemical reactions necessary to the end product require the use of many different materials in the construction of process equipment.

Some of the materials that must be welded in our shop are steel, 18-8 stainless, Monel, "Durimet" 20, "Hastelloy" B, C and D, "Duraloy", "Duriron", cast iron, copper, red brass, yellow brass, "Everdur", bronze aluminum, lead, "Haveg" and numerous others. The oxyacetylene flame is used not only for welding and braze welding but for hard-solder applications, flame-cutting, stress-relieving, annealing and miscellaneous heating in the fabrication of steel, copper, stainless, aluminum and brass piping. Some of our everyday maintenance jobs are illustrated in the accompanying pictures.

In photo 1, a pipe coil that is to be used for cooling purposes in a chemical processing tank is being welded. The material is 1½-in., Schedule 80, seamless steel pipe (ASTM A-106, grade B). The coil turns were formed with the aid of the oxyacetylene flame.

The welding operator in the background of this photo is fabricating 4-in., Schedule 80, seamless steel piping for a new 360-lb steam line installation. This job requires approximately 150 welds.

The testing procedure is a factor of importance in welding control. All welded steel piping, either new or altered, is subjected to a hydrostatic test. The test pressure is equivalent to 1½ times the flange series pressure rating, at which test pressure all welds are hammered with a 2-lb hammer. The test pressure is then raised to twice the flange series pressure rating and held at this increased pressure while welds are inspected. Incidentally, you might like to know, no faulty welds have been found to date.

A typical flame-cutting operation is shown in photo 2. The cutting is being done on an entrainment separator to install an 8-in.-diameter sight glass. The sight glass is on the downstream side of the separator. The flow pattern can be studied through the entrainment section to determine just what alterations are needed to improve the liquid entrainment. Should a check of the flow pattern show poor distribution of the flow over the entrainment surfaces, alterations in the design of the equipment will have to be made.

In photo 3, a 20-in.-diameter hole for venting purposes is being cut in the top head of a processing tank. This is a safety precaution against a possible (but unlikely) chemical reaction that could occur during processing. The cooling coil shown in photo 1 will be installed in this processing tank.

Perhaps the largest application of flame-cutting in our plant is done in the salvage department, photo 4. All valves, fittings, pipe and flanges shown in this picture have been salvaged from alterations on process equipment and piping. The greater part of salvage work is on steel, naturally, but some copper and brass piping is also salvaged for re-use. A great deal of lead pipe and sheet lead used in sulphuric acid service is salvaged by melting it into 70-lb pigs, to be returned to the lead refiners.

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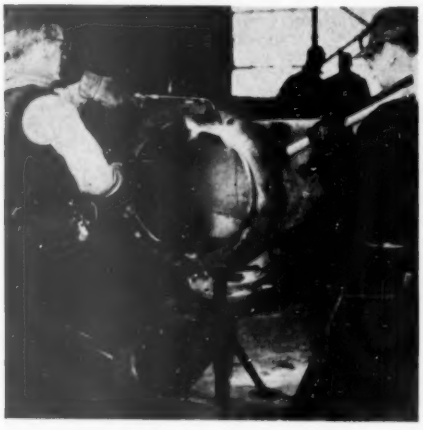
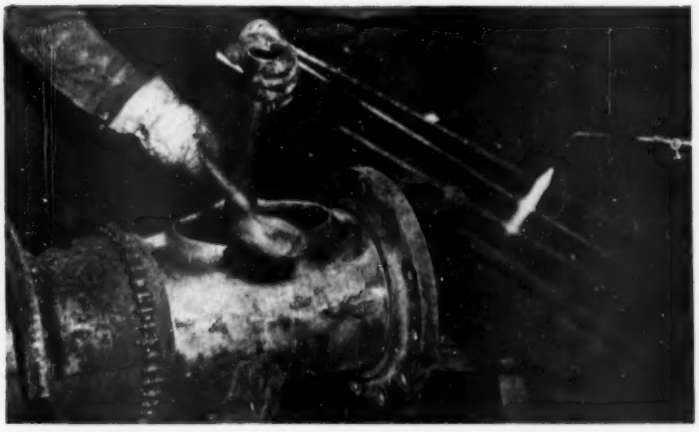
*Abstract of paper presented at the annual meeting of the International Acetylene Association, Chicago, April 7-9, 1954.

**3—HOLE of 20-inch diameter is being cut in a tank head for venting purposes**

**4—SALVAGE yard. All valves, fittings, pipe and flanges shown here were salvaged from alterations on process equipment and piping**



**5—TWO torches furnish the heat for "Van Stoning" on a 20-inch copper pipe**



**6—FORMING a 12-inch tee from a 12-inch copper pipe. After the hole has been cut, the edges are heated and flared into nozzle shape**

Copper ranks next to steel in usage at the Whiting plant. Repairs and alterations to copper stills, tanks, vessels, and piping are a considerable part of our maintenance work. The high temperature of the oxyacetylene flame is well suited to copper, which loses heat fast because of its high conductivity.

As an example of the ductility of heated copper, photo 5 shows a "Van Stoning" operation† on a copper pipe of 20-in. ID and ½-in. wall thickness. With two torches furnishing heat, the actual forming of the gasket face was completed in less than 30 minutes. The rough face, however, had to be ground and dressed to a surface suitable for a plastic coating job.

In photo 6 we see how a 12-in. tee is formed from a 12-in. copper pipe of ⅜-in. wall thickness. The successive steps are to: cut an oval hole in the pipe, heat the edges by small sections and flare it out into the nozzle shape. The ID of the flare on the tee is about 12¾-in. A flanged nozzle was inserted into the flare, making a slip or cup joint that was hard soldered. The term "hard soldered," as used in this article, should be defined as torch soldering with silver alloys and fluxes.

Two other types of joints are used in copper fabrication. One is the scarfed type, where the parts to be joined are lapped over on a long taper. This joint also requires hard soldering. The third type is a butt joint, which can be hard soldered but is usually an all-copper weldment.

A baffle was to be installed inside a copper tank 5 ft in diameter, with heads of 5/16-in. copper and shell section 3/16 in. thick. The baffle was to run across the 4-in. inlet nozzle. First step, of course, was to remove the head, which was hard soldered to the shell. By using five torches, the head was removed in about an hour. The baffle arrangement (photo 7) was then installed, the tank head replaced and the head-shell seam resoldered with hard solder. A hydrostatic test at 5 psi showed the new joint to be leakproof.

The routine braze-welding job requires the usual standard procedures

†Van Stone joint: a type of bolted pipe flange. Ends of the pipes are heated and flanged outwardly to form circular contacting flanges. A gasket is placed between these flanges and they are drawn tightly together by the bolted flanges, which are slipped over the pipe and press against them.

7—HERE is how a baffle was installed inside a 5-ft copper tank

8—CAST-IRON head from gas compressor aftercooler was successfully repaired this way. One man braze welded while his partner maintained preheat

in preparation, preheat and application. While jobs of this type are an everyday occurrence, occasionally we have one that requires a more careful procedure. Such a job is illustrated in photo 8.

This cast-iron head is one of five from a bank of gas compressor aftercoolers. The cooler sections are arranged in series, five sections high, with gas at 300 psi on the shell side and water at 30 psi on the tube side. During an emergency operational shut-down, the water side froze and burst the heads. As no replacements were immediately available, the broken heads had to be repaired.

Joint preparation consisted of grinding the break to a V-shape with an included angle of about 95° and preheating the entire casting to about 450 F, using two torches. Then, while one operator maintained the preheat temperature, another did the brazing. To avoid distortion, three separate passes were laid. After the last pass, the head was protected from drafts and allowed to cool. A facing cut, taken across the large flange face, indicated a maximum distortion of 0.010 in.

The silver solders we use for "hard soldering" have melting points ranging from 1,125 F to 1,360 F and flow points from 1,145 F to 1,600 F, depending on their composition. This may not mean too much in the original construction of the joint (except from the standpoint of corrosion resistance), but it can be somewhat of a problem in repairs and alteration. For example, in removing a tank head, the longitudinal shell seam opened up about 4 in. This seam was a silver-soldered butt joint in 3/16-in. copper. Our problem was how to avoid opening up the joint further without resorting to some elaborate clamping arrangement to hold the seam together during resoldering.

To effect the repair, we used an alloy of 15% silver, 80% copper and 5% phosphorus. This rod has a melting point of 1,185 F and a flow point of 1,280 F, at which temperature the solder in the original joint was not disturbed. We started at the open end of the shell seam and worked back to the original joint. A great deal of care was taken to keep the heat as close as possible to the minimum flow-point temperature of the rod.

## Safety Practices

You may wonder how we are able to use the flame in a chemical plant, where explosive gases and highly flammable liquids are constantly present. We feel that our safety practices are adequate to insure protection.

For fire-protective purposes, the plant is divided into different fire zones. Some zones are designated as particularly hazardous, and no welding, flame-cutting or use of equipment powered with internal-combustion engines is permitted in these areas. Any maintenance job that requires welding must be moved either to the shop or to a zone where welding can be performed. It goes without saying that in such instances the problem of moving out the equipment often requires a great deal more time and effort than the actual repair work.

Production supervision is notified when weldors go on a job in order to make sure the job is safe and that safe procedure is followed. A hazardous work permit is required for use of an open flame, hot metal or spark-producing tools in restricted areas. Welding machines, welding and cutting torches, soldering irons and soldering pots are classified "Class A Hazardous Work." Grinders, chipping hammers and drills are classified "Class B Hazardous Work." The permit also covers the instructions and precautions to be taken in preparing equipment for repairs and in entering equipment such as tanks and vessels for inspection or repair.

The plant fire protection engineer usually writes the permit in detail to specify preparation before work is started and the precautions necessary to protect personnel and prevent fire and explosions. Flame-cutting, welding and lead burning require extra preparation and more precautionary measures before work is started. In addition, a person familiar with the processes and equipment is on the job to guard against possible hazards.

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# on the job . . .

## Cracked cutters repaired

MILLING cutters range in price from $30 to several hundred dollars. Damaged ones are normally scrapped, resulting in a dead loss, but Temco Aircraft Corp., Dallas, Tex., has found a way to put cracked milling cutters back into operation on the same day as the damage.

The broken cutter is now routed to William P. Alberts, a maintenance department weldor. He fits together the pieces in a simple fixture he made from ground boiler plate (picture). When fit and alignment are perfect, the pieces are secured with C-clamps and tacked in two places with a high-alloy tool-steel electrode. Then the cutter is held to a 7 by ¼ in. grinding wheel, and a deep groove is ground along both sides of the crack to allow Alberts to get as close to a 100% weld as possible.

Two rings cut from 10-in. ID steel pipe provide a second fixture for preheating and welding. The cutter is placed between these rings, which are tightened by means of four ½ by 4 in. bolts. For further security, smaller bolts, attached to steel cross-pieces in each ring, are secured tight against the cutter.

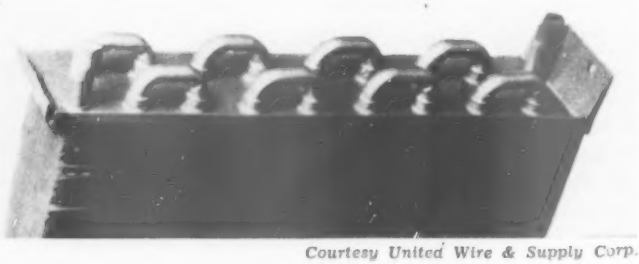
Alberts preheats both fixture and cutter to about 700 F. He welds with the same tool-steel electrode used for tack welding, and heats the cutter between passes with an oxyacetylene torch.

Welding requires about 30 minutes, exclusive of set-up and preheating time. Alberts then normalizes cutter temperature and places the tool (still in its fixture) on edge inside a box to cool. When cool, the weld is ground flush, and the cutter is ready to go back in service.

**W. P. ALBERTS has broken cutter aligned in jig and crack ground**

For welding tool-steel circular cutters, Alberts recommends:

1. Welding from the inside or hub of the cutter to the outside cutting edge.
2. Keeping an equal amount of weld on both sides of the groove, which means holding the arc as closely as possible to the center of the groove.
3. Getting the torch flame on the work immediately after a tack or pass has been made.
4. Balancing the weld by welding first at one extremity and then at the other. By alternating in this fashion, Alberts avoids too much "pull" at any one point.



*Courtesy United Wire & Supply Corp.*

## Three rejects out of 7,980 bends

BUSH Mfg. Co., Hartford, Conn., recently reported an outstanding record in the field of metal joining. Using a copper brazing alloy, Bush brazed 7,980 U-bend joints with only three rejects.

The operation called for 24 rings of brazing alloy on copper U-bends and was done on a continuous chain belt running through fixed torches. Each assembly was tested under 300 psi air pressure.

## Safety with hydrogen

A HYDROGEN atmosphere is sometimes used in heat-treating and brazing processes, both in the laboratory and in actual production of delicate parts*. Safe operation depends on the hydrogen being above atmospheric pressure and maintaining a continuous flow. If the hydrogen pressure is allowed to fall below that of the atmosphere, air and hydrogen will mix. At an approximate temperature of around 1,000 F in the operating chamber, anywhere from 7 to 73% of hydrogen in the mixture is apt to produce an explosion.

R. M. Carson, formerly of the National Bureau of Standards and now of the Diamond Ordnance Fuse Laboratories, Department of Defense, has found a way to completely eliminate the hydrogen-air explosion hazard. The admission of outside air when the hydrogen pressure fails is prevented by cutting in a cylinder of helium.

The helium cylinder is connected in the hydrogen network, and the pressure regulator in the helium line is set at from 10 to 20 psi lower than the hydrogen pressure. The helium will flow only if the hydrogen-line pressure drops to that of the preset pressure of the helium. When this happens, the hydrogen in the system is rapidly expelled and replaced by the safe helium. Thus a hazardous mixture of air and hydrogen is never allowed to enter the high-temperature operating chamber.

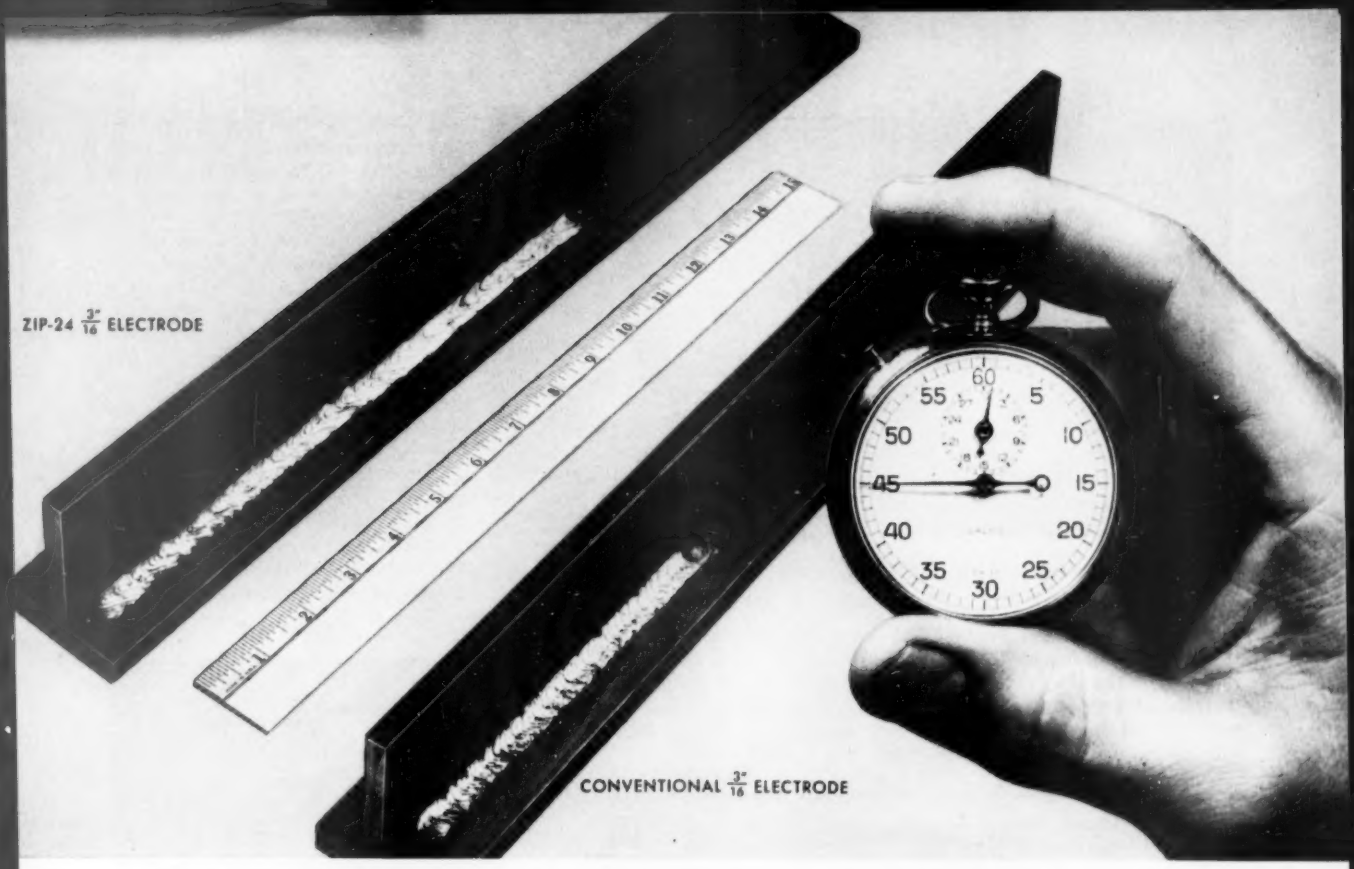
* * *

## Water separator†

A NEW water separator, produced by the Warner Lewis Co., Division of Fram Corp., Tulsa, Okla., takes water and solids out of pipelines that carry fluid products. The separator employs a treated wood fibre packing. The water particles are coalesced into large droplets that settle rapidly.

In order to obtain optimum flow conditions and minimize pressure losses, much of the Warner Lewis separator piping is fabricated with welding fittings. Usually the piping and fittings are of carbon steel, but Monel is extensively used for the various components of separators installed aboard the Navy's aircraft carriers since sea water is so corrosive. The separators for aircraft carriers will process aviation gas at a rate of 1,200 gallons per minute.

*See "Copper gold brazing under glass," December, 1953, WELDING ENGINEER.
†Data from Tube Turns, Louisville, Ky.




# New Westinghouse ZIP-24 Electrode welds twice as fast—better, easier, too

The greatest advancement in mild steel welding electrodes in years. That's what Westinghouse research, plus years of experience as an actual user of welding processes, has made the new ZIP-24. It now gives you a greater combination of plus features than any other powdered iron electrode. For example:

FASTER WELDS—*50 to 70%* greater deposit rates. And an increase of *30 to 50%* in footage of fillet or lap weld per minute.

BETTER WELDS—balanced fillets give appearance of "machined finish" . . . no undercut with fillet and lap welds . . . perfect wall wash-up . . . easier slag removal . . . minimum spatter loss that reduces cleaning time. And if that's not enough . . .

EASIER WELDS—even-edged, smooth, finely rippled weld beads even when handled by an inexperienced operator. It's ideal for "drag" technique . . . gives greater flexibility in weld types . . . can be used with either a-c or d-c. And it's available now for . . .

IMMEDIATE DELIVERY—made possible with the opening of our second electrode plant . . . a brand-new Westinghouse Electrode Plant at Montevallo, Alabama. Over 57,000 square feet of additional manufacturing space to give you immediate delivery on the new ZIP-24 and the complete line of quality electrodes . . . *manufactured by Westinghouse.* J-21859

**LEARN MORE ABOUT THE NEW ZIP-24 ELECTRODE!**

YOU CAN BE SURE...IF IT'S Westinghouse

WESTINGHOUSE ELECTRIC CORPORATION
Welding Department, P. O. Box 868, Pittsburgh, Pa.

Please send me a copy of your new folder on the ZIP-24 electrode (B-6389).

☐ I would like free samples of the new ZIP-24 electrode.

☐ Send me literature on the complete line of Westinghouse Electrodes (B-6070).

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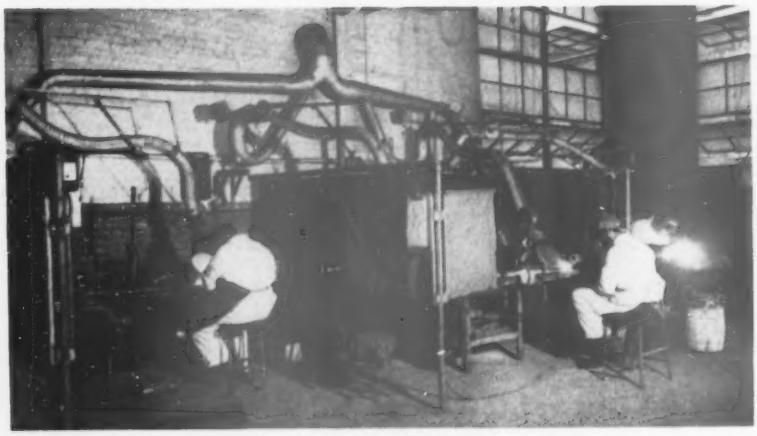
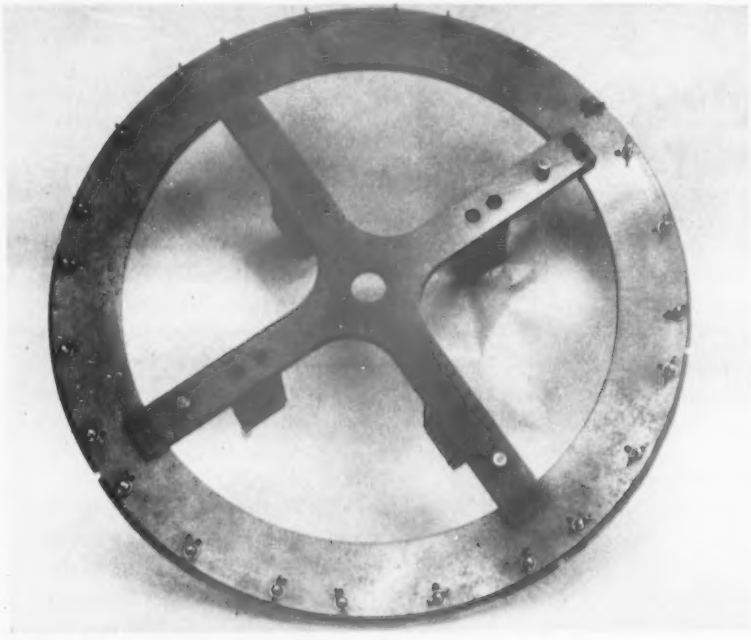
WE-10-54



## Adequate ventilation for Pullman maintenance

ALL WELDING processes are employed to maintain and keep Pullman cars safe for the passengers, but at the same time the Pullman Co. insists that its workers be safe, too. Above view of welding department of the Chicago shops shows the protective booths (screens are open to permit photo) and the ventilation system. A powerful fume exhauster is tied into a duct system. Inside each booth is a flexible tube collector, capable of removing fumes from any point within the booth.



## Plastic jig for both spot and seam welding

IN REPLACING metal with plastic jigs and fixtures for welding jet engine parts, Template Reproduction & Engineering Co., Philadelphia, ran up against a design problem. The plastic jigs were lighter in weight and had better surface wear resistance but also had inherently low strength and poor wear resistance in tapped holes. The designers required strong threads.

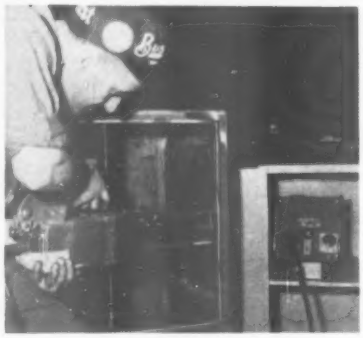
The dilemma was resolved by specifying stainless-steel screw thread inserts at all critical screw joints. These gave threads that showed no wear after repeated removal and fastening.

The accompanying picture shows a wheel fixture designed for both spot and seam welding in successive operations on the same parts. The spot welding is accomplished with the parts held in position in the four clamps mounted on the spokes of the hub piece. The hub piece is then disassembled by removing the eight flathead screws (heads visible) that secure the four ends of the spokes to the rim.

The ring parts to be seam welded are held between the rim and eight plastic sections. A section is tightened in place by three thumbscrews. A copper sheet bonded to the underside of the plastic rim serves as the lower electrode. After seam welding, the thumbscrews are loosened, the welded part is removed and the hub piece is screwed back in place to prepare the fixture for the spot welding part of the assembly.

Although the screws are thus replaced many times—always rapidly and often too tightly—the wire-thread inserts provide undamaged threads.

* * *



*Courtesy Aro Spot Welders*

## For inside jobs

BRING the machine to the work when you can't bring the work to the machine. At P. Feiner & Son, New York City fabricator of sheet metal, a portable gun is used in conjunction with stationary machines for those hard-to-get-to welds. It is very often outright impossible to reach inside a cabinet with anything but a gun of this type. Aided by the gun welder, one man can do all alone an assembly that formerly took two or three men.

* * *

## Spot-welding delicacy

ORIGINALLY developed by the General Electric Co. Ltd., of London, England, for its own experimental work, improved spot-welding apparatus is said to have taken resistance welding to altogether new levels of delicacy and precision. It is claimed that joints have been made in cadmium-silver and nickel-silver relay springs only 1/40 and 1/100 in. thick. Diaphragm parts for hearing aids have also been welded.

*—McGraw-Hill World News*

# THERE'S A RIGHT SYLVANIA ROD...

## FOR EVERY INERT GAS WELDING JOB

**SYLVANIA OFFERS 3 HIGH-QUALITY TUNGSTEN ELECTRODES**

As every welder knows, you can't use the same electrode on every job. For best performance and longest electrode life, you must select the right rod for each particular purpose.

This is why Sylvania offers *3 different* tungsten electrodes to cover the full range of requirements for any inert gas arc welding job.

**Sylvania . . . a pioneer in tungsten**

Sylvania is a pioneer in the development of tungsten in many forms. As a result, our engineers and metallurgists have provided the precise type of tungsten rod for every need. Sylvania's research and advanced techniques in manufacture and quality control . . . from ore to finished product . . . assure time-saving operation and dollar-saving dependability.

Either Sylvania Puretung, Thoriated Tungsten or Zirtung Electrodes will answer any inert gas welding problem you have. So order the types you require from your nearest Sylvania Welding Distributor.

**QUICK SOLUTIONS TO YOUR TOUGHEST PROBLEMS!**

This new chart keeps valuable welding hints and short cuts at your fingertips. Tells what to do about difficult starts, brittle tips, contamination . . . and many other tricky problems. A real time and money saver! Mail coupon for free copy today!

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In Canada: Sylvania Electric (Canada) Ltd.
University Tower Bldg., St. Catharine Street, Montreal, P. Q.

**Seagoing** – In designing their line blind valves for use in an oil tanker, Hamer engineers had to give special consideration to the danger of leaks developing from corrosive salt water flush. To further complicate the problem, casting a limited number of so many different sizes of valves would be uneconomical.

**Welding is the solution** –They found the most economical way to insure corrosion-resistance was to overlay the packing and gasket contact faces with "140" Monel Electrodes. The "140" Monel has a special low-carbon flux coating that permits crack-free overlays directly on the steel.

# How Monel overlay is used to add corrosion-resistance

## *. . . where it's needed most*

Sometimes it is uneconomical to use solid metal when only one surface is exposed to corrosives. When you are faced with that problem, it will pay you (as it did Hamer Valves, Inc.) to look into INCO's "140" series of electrodes for corrosion-resisting overlays. Data on the "140" series is yours for the asking in Bulletin T-2 — *Fusion Welding of Nickel and High Nickel Alloys*. Write for a copy today.

**THE INTERNATIONAL NICKEL COMPANY, INC.**
67 Wall Street New York 5, N. Y.

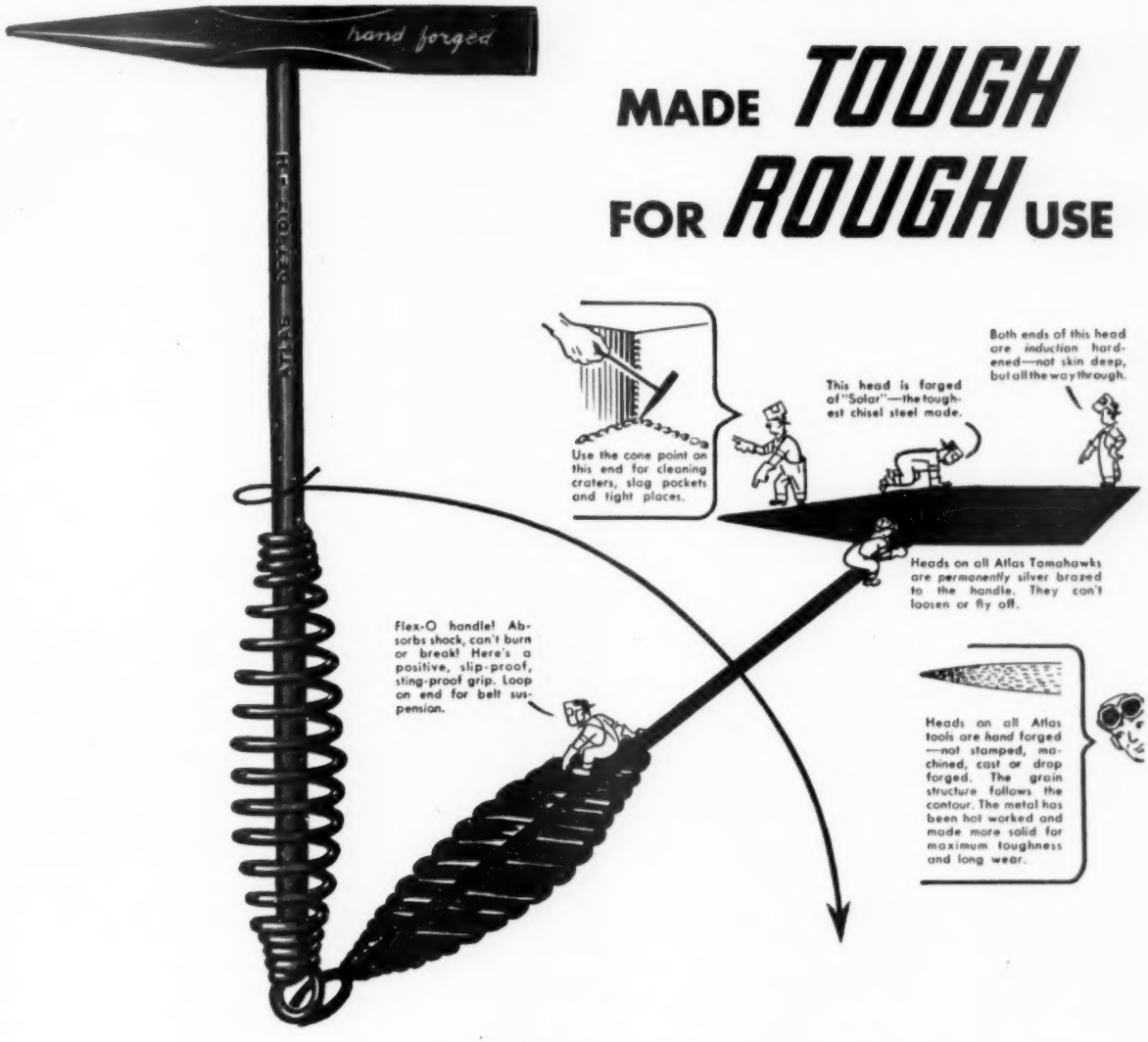
**Ready for Machining** – The "140" Monel overlays on the rough-machined steel have excellent ductility and adherence. Furthermore, the corrosion-resistance is comparable to solid Monel; and no preheat was required on the low carbon steel.

**47 of these valves,** ranging from 4 to 12 inches in diameter, were produced for the vessel by Hamer at its Long Beach, California, plant. It took approximately 1350 lbs. of 3/16-inch diameter "140" for the corrosion-resisting overlays. When installed, the valves provide a permanent positive shut-off between tanks.

INCO TRADE MARK **Welding Products** *Electrodes · Wires · Fluxes*

# ATLAS "TOMAHAWKS"

## MADE *TOUGH* FOR *ROUGH* USE


hand forged
Use the cone point on this end for cleaning craters, slag pockets and tight places.
This head is forged of "Solar"—the toughest chisel steel made.
Both ends of this head are *induction* hardened—not skin deep, but all the way through.
Heads on all Atlas Tomahawks are *permanently* silver brazed to the handle. They can't loosen or fly off.
Flex-O handle! Absorbs shock, can't burn or break! Here's a positive, slip-proof, sting-proof grip. Loop on end for belt suspension.
Heads on all Atlas tools are *hand* forged —not stamped, machined, cast or drop forged. The grain structure follows the contour. The metal has been hot worked and made more solid for maximum toughness and long wear.

This Model H, Atlas Tomahawk with cone and chisel head is built to take more punishment and last longer than conventional weld cleaning tools. Welders like its balance and feel. It help them turn out better work in less time with less fatigue.

Ask your welding supply dealer to show you the complete Atlas line of 27 chippers including their new designed "Dual Tools."

**Atlas WELDING ACCESSORIES COMPANY**

707 E. LEWISTON AVENUE FERNDALE 20, (DETROIT) MICHIGAN

# free literature..... USE CARD ON OPPOSITE PAGE

**1** TIG WELDING — Air Reduction Sales Co. 16-page Catalog ADC 709B covers in detail features of the "Heliwelding" process and equipment used with it. The process is a Tig (tungsten inert-gas) method used to join light gages of the "hard-to-weld" metals.

**2** GRINDING WHEELS — Raybestos-Manhattan, Inc. Bulletin 6925 describes rubber-bonded, centerless grinding wheels for roughing and finishing operations. One page is devoted to a simplified price list.

**3** A-C WELDER—The Lincoln Electric Co. 2-page illustrated leaflet lists specifications of "Fleetwelder Special," new a-c welder offered in 300, 400 and 500-amp models. Said to provide steady arc and maintain accurate current control.

**4** SHOT-BLAST ABRASIVE—American Wheelabrator & Equipment Corp. 8-page Bulletin 89-A describes "Wheelabrator Steel Shot," a cast-steel, heat-treated blast-cleaning and peening abrasive.

**5** INDUCTION HEATING—Electric Arc, Inc. High-frequency (400 kc) induction heater, called "Kilotron," is subject of 4-page brochure. Both the 10-kw and 20-kw models are described. Some applications: brazing, soldering, heat treating, annealing.

**6** SPOT WELDER—Birdsell Mfg. Co., Inc. Improved spot welder "Model 130 T" is subject of 2-page illustrated leaflet. With electronic timer, machine is said to do work of a 10-kva conventional timer-equipped model. Chart includes specifications and operating instructions for both the welder and the timer.

**7** WELDING TRANSFORMER—Sciaky Bros., Inc. Bulletin No. 328-10 illustrates and lists specifications of new welding transformer for portable multiple-point, package-unit and indirect-series welding applications.

**8** FLEXIBLE-SHAFT UNITS — Stow Mfg. Co. 1-page Bulletin 536 describes new applications of flexible shaft machines for sanding, grinding, polishing, etc.

**9** ELECTRODE—Pacific Welding Alloys Mfg. Co. Bulletin describes new "Phos-Bronze" electrodes for all position welding of brass, bronze, copper, cast iron and steel.

**10** ALUMINUM BRONZES—The International Nickel Co., Inc. Physical properties of aluminum bronzes containing nickel additions up to 5% are described in 12-page Bulletin A-133, entitled "Nickel-Aluminum Bronze." Included in the discussion is their weldability.

**11** ALUMINUM PREPARATION — Oakite Products, Inc. 16-page booklet entitled "5 things to know about preparing aluminum for spot welding" offers comprehensive study of cleaning, deoxidizing, rinsing and drying aluminum as well as describing equipment for use in such preparation.

**12** PORTABLE HEATERS—The Silent Glow Oil Burner Corp. Illustrations, specifications and test reports are included in catalog that describes and lists applications of firm's portable heaters. One such application: keeping construction weldors warm while they work on wintertime field jobs.

**13** ABRASIVES—Metal Removal Co. 40-page "Abrasive and Cutting Tool Catalog" contains charts suggesting abrasive grain selection and grade recommendations for specific jobs. Also describes portable air and electric grinders. Includes comprehensive tool selection chart.

**14** CUT-OFF WHEELS — Norton Co. Revised edition of "Norton Cut-Off Wheels," 36-page manual, gives instructive information on types of cutting-off machines and abrasive cut-off wheels, their selection and applications.

**15** BRAZING—All-State Welding Alloys Co., Inc. 24-page "Brazing Manual" contains data for brazing shapes, sheet, castings, tubing and assemblies of copper, brass, steel, aluminum and cast iron. Diagrams are included

**16** POSITIONERS—Unique Turntable and Equipment Corp. Catalog No. 54 illustrates and gives specifications of welding positioners and turning rolls. Includes 4-page price list and insert page of schematic diagrams.

**17** WELDING ALUMINUM—Aluminum Co. of America. "Welding Alcoa Aluminum" is title of 176-page book that is a revision of the welding section of an earlier book published by this firm. WELDING ENGINEER reviewed it last month.

**18** MEASURING TEMPERATURE—Tempil Corp. "How Temperatures Are Measured" is title of 8-page booklet by Dr. G. M. Wolten. Among topics covered is the monitoring of surface temperatures by means of changes in color or physical state.

**19** R-W WELDING TIPS — Welding Sales & Engineering Co. 20-page catalog includes price lists of "Tuffaloy" resistance-welding alloys, including tips, adapters, holders, seam and tube-mill wheels and castings. Illustrated.

**20** WELDER-POWER UNIT — Hobart Brothers Co. Illustrated leaflet describes and lists applications of new dual-purpose a-c power supply and welder.

**21** TURNING ROLLS — Aronson Machine Co. 4-page brochure depicts turning rolls for use in welding. Includes illustrations, specifications and schematic diagrams.

**22** TEST UNIT — North American Philips Co., Inc. Illustrated bulletin explains operation of new magnetic-particle test unit called "Portaflux" for use in checking welds as well as steel and iron objects for surface cracks and discontinuities.

**23** BRAZING—The Gasflux Co. Literature packet on "Gasflux" process, a specialized method of brazing steel and other metals with bronze rod and with silver solder, includes reprints of articles on production applications that have appeared in WELDING ENGINEER and other publications.

**24** AUTOMATIC WELDING — Cayuga Machine and Fabricating Co., Inc. Bulletin No. 5301 is 4-page illustrated pamphlet describing firm's automatic welding equipment, which includes turning rolls, positioners and turntables.

**25** WELDING ELECTRODES—Metal & Thermit Corp. 30-page catalog includes descriptive information and application and procedure data on all "Murex" mild-steel and low-alloy arc-welding electrodes. Also contains formulas for estimating welding costs and other reference material.

**26** INDEXING UNIT—Sciaky Bros., Inc. Bulletin No. 319-12 illustrates and describes firm's "Dial Feed" rotary indexing unit for applications on resistance welders, machine tools and in various assembly operations.

**27** HARDFACING — Rankin Mfg. Co. Form B-4, 8-page brochure entitled "What hardsurfacing can do for You," provides general information regarding firm's hardfacing materials. Describes various electrodes and rods and lists suggested applications for each.

**28** ELECTRODE OVEN—Phoenix Products Co. Specification bulletin shows plant and field applications for bantam-size (20½ in. high) "DryRod" oven for stabilizing low-hydrogen, stainless-steel and other mineral-coated, specially-alloy electrodes. Portable unit operates on 115 volts.

**29** EXHAUST HOSE — The Flexaust Co. Bulletin No. 40 describes industrial installations of hose and ducts for moving air, dust, fumes and gases.

**30** TITANIUM — Mallory-Sharon Titanium Corp. 4-page illustrated booklet gives complete physical properties, forging recommendations, etc. for "MST 3A1-5Cr" titanium alloy that contains 3% aluminum, 5% chromium and less than 0.1% carbon.

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Getting all the information about all the significant new developments in welding every month is a tough . . .and time-consuming . . . job. To save your time, the editors of WELDING ENGINEER screen scores of new catalogs and bulletins each month and select only the ones they think will be of interest to you. These are summarized for your convenience on page 64. The companies issuing this material welcome your request for copies.

To save your time in making such requests, simply use one of the attached post cards.

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# NEW!

## TUBE-TURN Full-Encirclement Saddle improves "hot-tapping" of piping

SAFER, STRONGER "hot taps" are now made possible by the TUBE-TURN Full-Encirclement Saddle shown above. This new product is the first of a group of important developments of Tube Turns' unique pulsation pressure testing program.

Split longitudinally on a horizontal plane, perpendicular to the axis of the outlet, this new "hot tapping" reinforcement eliminates welds in the critical crotch area. Its installation requires a minimum amount of field welding. When used with high yield strength pipe, no welds are required between saddle and line pipe.

The TUBE-TURN Full-Encirclement Saddle is designed for high yield strength thin-wall pipe and for heavy wall cylinders used for headers, bottles and pulsation dampeners. It can be supplied for pipe sizes through 42", any outlet size, in composition and wall thickness to match service conditions.

*The Leading Manufacturer of Welding Fittings and Flanges*

**TUBE TURNS** LOUISVILLE 1, KENTUCKY

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"tt" and "TUBE-TURN" Reg. U.S. Pat. Off.

NOW INSTALLED

# How to install the new TUBE-TURN Full-Encirclement Saddle for a "Hot Tap"

1. *Weld branch outlet pipe to run pipe according to normal procedure.*
2. *Position and block up bottom half of full-encirclement saddle.*

3. *Slip top half of full-encirclement saddle over branch outlet. Bring two halves together tightly by means of clamp such as shown.*

4. *Tack weld longitudinal lap plates to top half of saddle, remove clamp and complete welding of plates. (Plates are shop-welded to bottom half).*

5. *Fillet weld saddle outlet to branch pipe.* 6. *Join branch pipe to* TUBE-TURN *Welding Neck Flange. Normal tapping procedure follows.*

NOTE THAT when used with high yield strength, thin-wall pipe, as shown above, circumferential welds between saddle ends and run pipe are not required. This precludes possibility of failure due to underbead cracking or to local stress concentrations which exists at such attachment welds with conventional saddles or other types of "hot tap" fittings which must be fillet welded to high yield strength, thin-wall pipe. The TUBE-TURN Full-Encirclement Saddle fully meets all requirements for reinforcement of welded branch connections as developed by Section 8 of the Code for Pressure Piping.

*This new, advanced design is another example of TUBE TURNS' pioneering... why it pays to do business with the leader.*

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TUBE-TURN

# New designations for aluminum

A NEW four-digit system of alloy designations for wrought aluminum and aluminum alloys has been developed by The Aluminum Association and became effective October 1, 1954. The first digit of each designation indicates the general group to which a given alloy belongs. The last two digits identify the alloy or indicate the aluminum purity. The second digit indicates any modifications of the original alloy or impurity limits. The temper designations in effect since 1947 are being continued without change and, as in the past, will follow the alloy designations.

To aid in the transition from designations previously in use to the new system, many of the old numbers are retained as the last two digits of the new numbers. Thus, alloy 3S becomes 3003; 24S becomes 2024; and 61S becomes 6061. Sheet was initially the only wrought aluminum product made on a large scale so the wrought alloy designations were followed by the letter "S."

Even when wire and other wrought products began to be produced, the "S" designations were retained. Old and new designations for 87 alloys are compared in Table I.

In the four-digit index system, the first digit indicates the alloy group as shown in Table II. Thus 1xxx indicates aluminum of 99.00% minimum and greater, 2xxx indicates an aluminum alloy in which copper is the major alloying element and 3xxx an aluminum alloy with manganese as the major alloying element, etc. Although most aluminum alloys contain several alloying elements, only one group—6xxx for alloys with magnesium and silicon as major alloying elements—designates more than one alloying element.

The 1xxx series, designating minimum aluminum purities of 99.00% and higher, differs basically from the other series. The last two digits indicate the minimum aluminum percentage. These digits are the same as the two digits to the right of the decimal point in the minimum aluminum percentage when it is expressed to the nearest 0.01%. The second digit designates any modifications in the impurity limits. In the 2xxx-8xxx series, the second digit indicates a modification of the alloy and replaces the letters commonly used for this purpose in the past.

The 2xxx through 8xxx series designate groups of alloys in which the following are major alloying elements: copper 2xxx; manganese 3xxx; silicon 4xxx; magnesium 5xxx; magnesium and silicon 6xxx; zinc 7xxx. The 8xxx series is used for major alloying elements other than the foregoing, and the 9xxx series is unused at present. In all of these groups, the last two digits are generally the same as those formerly used to designate the alloy and do not designate aluminum percentages.

Experimental alloys will continue to carry a prefix "X", which will be dropped when an alloy becomes standard.

## Table I – Conversions

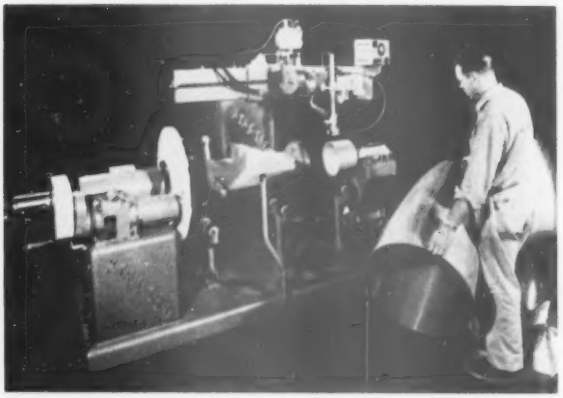
| OLD Commercial Designation | NEW AA Number | OLD Commercial Designation | NEW AA Number | OLD Commercial Designation | NEW AA Number |
|---|---|---|---|---|---|
| 99.3[1] | 1230 | 17S | 2017 | 56S | 5056 |
| 99.6, CD1S | 1160 | A17S | 2117 | XC56S | X5356 |
| 99.75[2] | 1175 | 18S | 2018 | C57S, K157 | 5357 |
| 99.87, EB1S | 1187 | B18S | 2218 | 61S | 6061 |
| EC[3] | EC | F18S | 2618 | 62S | 6062 |
| AA1S | 1095 | 24S | 2024 | 63S | 6063 |
| BA1S | 1099 | 25S | 2025 | 66S | 6066 |
| CA1S | 1197 | B25S | 2225 | 70S | 7070 |
| AB1S | 1085 | 32S | 4032 | 72S | 7072 |
| EB1S, 99.87 | 1187 | 43S, K145 | 4043 | 75S | 7075 |
| FB1S | 1090 | C43S, 44S, K143 | 4343 | B77S | 7277 |
| AC1S | 1070 | XE43S | X4543 | XA78S | X7178 |
| BC1S | 1080 | 44S, C43S, K143 | 4343 | XB80S | X8280 |
| CC1S, R998 | 1180 | 45S | 4045 | K112 | 8112 |
| JC1S | 1075 | 50S | 5050 | K143, C43S, 44S | 4343 |
| AD1S | 1050 | A50S, K155, R305 | 5005 | K145, 43S | 4043 |
| BD1S | 1060 | XD50S | X5405 | K155, A50S, R305 | 5005 |
| CD1S, 99.6 | 1160 | A51S | 6151 | K157, C57S | 5357 |
| ED1S | 1150 | XB51S | X6251 | K160, J51S | 6951 |
| AE1S | 1030 | J51S, K160 | 6951 | K162, R306[4] | 6003 |
| BE1S | 1145 | 52S | 5052 | LK183 | 5083 |
| 2S | 1100 | F52S | 5652 | K186 | 5086 |
| 3S | 3003 | 53S | 6053 | R301 Core, 14S | 2014 |
| 4S | 3004 | B53S | 6253 | R305, K155, A50S | 5005 |
| XA5S | X3005 | XD53S | X6453 | R306, K162[4] | 6003 |
| 11S | 2011 | E53S | 6553 | R308[5] | 1130 |
| 14S, R301 Core | 2014 | A54S | 5154 | R399 | 8099 |
| XB14S | X2214 | B54S | 5254 | R995 | 1235 |
| XC16S | X2316 | X55S | X5055 | R998, CC1S | 1180 |

(1) *Cladding on Alclad 24S (Alclad 2024).*
(2) *Cladding on No. 2 Reflector Sheet.*
(3) *EC—The designation for electrical conductor metal is not being changed since it is so firmly established in the electrical industry.*
(4) *Cladding on R301 and Alclad 14S (Alclad 2014).*
(5) *No. 1 Reflector Sheet.*

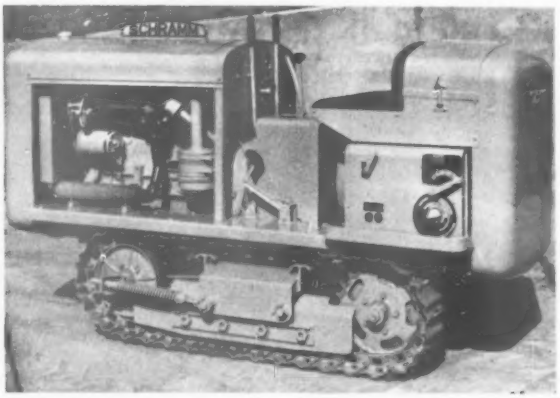
## Table II – Designations

| | | AA Number |
|---|---|---|
| Aluminum – 99.00% minimum and greater | | 1xxx |
| | Major Alloying Element | |
| Aluminum Alloys grouped by major Alloying Elements | Copper | 2xxx |
| | Manganese | 3xxx |
| | Silicon | 4xxx |
| | Magnesium | 5xxx |
| | Magnesium and Silicon | 6xxx |
| | Zinc | 7xxx |
| | Other element | 8xxx |
| Unused Series | | 9xxx |

# new products . . . . . USE CARD ON PAGE 65



FIXTURE can be used for automatic welding processes



CRAWLER carries 300-amp welder to inaccessible spots

## Welding fixture

**50** PRESSING of one button sequences all operations on this automatic circumferential expanding and welding fixture. Suggested applications: in manufacture of rockets, missiles, drop tanks, ordnance parts, code tanks, pressure vessels.

Manufacturer states any one of many automatic welding heads or processes can be used. Welding-head arm swings right 90 deg out of way; head or nose-cone holder swings down out of way for easy loading. End pressure and expanding mandrels are incorporated in this machine to provide utmost alignment of abutting edges, it is claimed.

AIRLINE WELDING AND ENGINEERING.

* * *

## Square spanner

**51** FOR use in welding two metal sections at right angles, a square spanner of sturdy construction is said to provide a means for keeping such sections together in the correct position. It can be used for tubes, bars and sections with thickness up to 2½ in.

TER HART'S KLEININDUSTRIE.

*—McGraw-Hill World News*

* * *

## Copper welding alloys

**52** FIVE new copper and copper-base welding alloys developed by this firm are "EutecTrode 280 DC," an arc electrode claimed to have unusual weldability, high-tensile strength and excellent corrosion resistance; "EutecTrode 300 DC," which deposits practically pure copper and may be used without preheating the base metal—special coating permits electrode to act as heating agent when a long arc is held; "EutecTrode 1850 AC" and "1850 DC," which are said to eliminate lengthy preheating necessary for torch brazing; "EutecTrode 1840 DC," which has characteristics similar to "1850" and was developed for weldments that require maximum machinability; "Eutec-CopWeld," a copper solder in paste form.

EUTECTIC WELDING ALLOYS CORP.

* * *

## Hardfacing electrode

**53** "MOLY-MANG" is new line of electrodes for build-up work. Manufacturer claims it produces an extremely high-tensile strength and recommends it for build-up work on manganese castings. Deposit hardness is 5 to 10 Rockwell C and it will work harden to 50 Rockwell C when subjected to peening or impact. Application is by a-c—d-c electric arc, reverse polarity.

MIR-O-COL ALLOY CO., INC.

* * *

## Magnifying plate

**54** MAGNIFYING glasses that are placed in back of the welding plate in helmets are for aiding weldors wearing bifocal prescription glasses. When a weldor tries to use the lower section of his glasses, he looks right into the blackness of the helmet, but with these plates the power of the upper section of bifocals is increased. They are not intended to replace prescription glasses.

The glasses are offered in four strengths: 1, 1.5, 2.5 and 3 diopter. They are 2 by 2 1/16 in., thus a separate glass is used for each eye. Sold only in pairs, each pair being of same diopter.

SELLSTROM MFG. CO.

## Mobile welder

**55** SELF-propelled crawler comes with a welder mounted in the rear to offset difficulty of getting such equipment to inaccessible places. The welder is a 300-amp, gasoline-engine-driven machine. Power from the engine is transmitted to the tracks through a chain, a differential and final bull-gear drive. Total overall width of the crawler is less than 32 in. Steering is accomplished by brakes on drive wheels, giving the machine ability to turn on its own center.

Recommended for contractors, railroads, pipeliners and drill-rig operators.

SCHRAMM, INC.

* * *

## Toggle clamp

**56** WEIGHING but 12 oz, the new "Destaco Model 507" toggle clamp has a holding pressure of 600 lb. Specially designed to hug the fixture, and with a "flop-over" action that flicks the spindle and holding bar completely away from working surface, the low silhouette of this clamp is said to bring new ease and convenience of work insertion and removal.

The clamp comes in two models—"507-U" and "507-S." The former features the *U* bar, which is recommended for adapting various spindles for proper work contact. Several spindles may be mounted on the bar. The latter model has the solid carbon-steel holding bar instead of the *U* bar and comes with a positionable bolt retainer that can be welded to the bar at any angle.

DETROIT STAMPING CO.

# SUCCESSFUL BRAZING

WITH

## SILVALOY

LOW TEMPERATURE SILVER BRAZING ALLOY

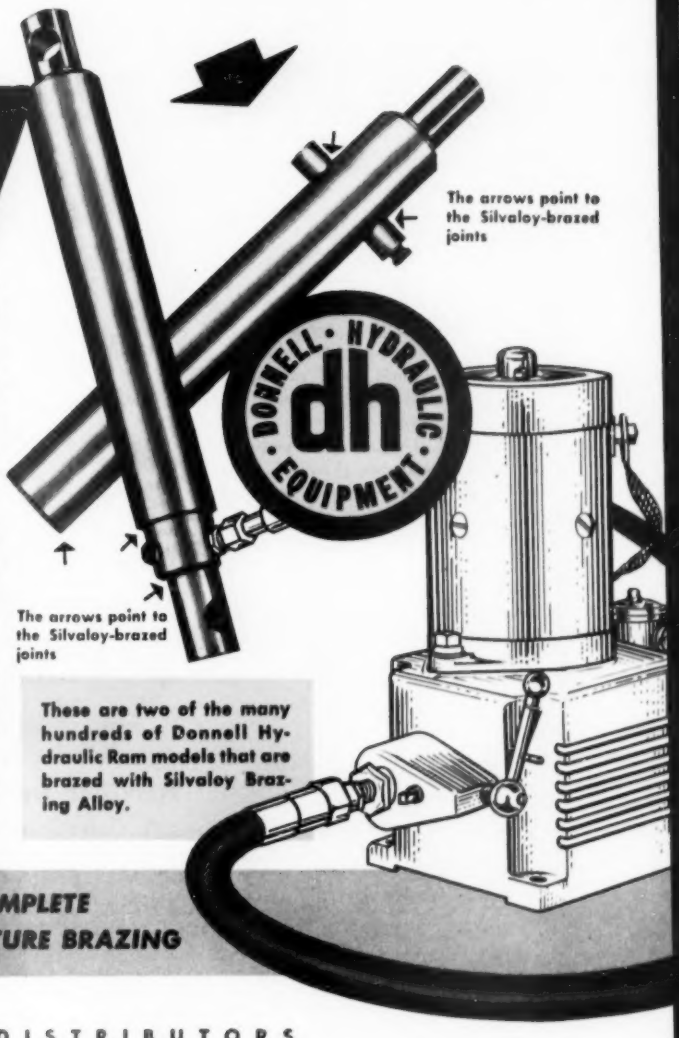
**Donnell Hydraulic Units have earned an outstanding reputation for efficient performance because they're engineered and soundly built for long life and dependable service. They deliver power reliably, and to precise requirements.**

**The units shown here are two of the hundreds of Donnell hydraulic rams designed for pressure ranges from 100 psi to 10,000 psi and up to 50 ton capacity.**

### JOINT STRENGTH IMPROVED — COSTS REDUCED

**Silvaloy Brazing alloys have helped to increase the strength and lower manufacturing costs of Donnell rams. Joints were formerly arc-welded but are now brazed with Silvaloy 45 preforms, on an automatic production turntable — using gas-air burner heat.**

**Low Temperature Silvaloy Brazing is helping to speed production, lower costs and improve results for manufacturers in many fields. Call the Silvaloy Distributor in your area for complete information — or ask him for technical assistance. A Silvaloy Technical Expert will be sent to your plant.**




The arrows point to the Silvaloy-brazed joints

The arrows point to the Silvaloy-brazed joints

**These are two of the many hundreds of Donnell Hydraulic Ram models that are brazed with Silvaloy Brazing Alloy.**

***SEND FOR THIS COMPLETE GUIDE TO LOW TEMPERATURE BRAZING***

### THE SILVALOY DISTRIBUTORS

**EAGLE METALS COMPANY**
SEATTLE, WASH. • PORTLAND, ORE.
SPOKANE, WASH.

**EDGCOMB STEEL COMPANY**
PHILADELPHIA, PA. • CHARLOTTE, N. C.
BALTIMORE, MD. • YORK, PA.
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**LICENSED CANADIAN MANUFACTURER**
BAKER PLATINUM OF CANADA, LTD.
TORONTO • MONTREAL

# THE AMERICAN PLATINUM WORKS

**231 NEW JERSEY RAILROAD AVENUE • NEWARK 5, NEW JERSEY**

## Oxyacetylene outfit

**57** LIGHTWEIGHT portable oxyacetylene outfit is for light-to-medium welding and cutting work in auto-repair shops, welding and sheet-metal shops and industrial plants. The "Prest-O-Lite" features an "all-in-one" torch with interchangeable welding and cutting tips. The same torch heats, bends, solders, brazes, welds and cuts—without need for special attachments.

As furnished, the outfit welds up to 3/16 in. and cuts through ⅜ in. of solid steel, according to manufacturer. Additional tips are available for welding up to ⅜ in. and cutting up to 2 in. Set includes, besides torch, one cutting and three welding tips, oxygen and acetylene pressure regulators, fitted double hose, friction lighter, goggles and wrench.

LINDE AIR PRODUCTS CO.

* * *

## Soldering unit

**58** RESISTANCE-type soldering unit "Model 23" was developed for soldering of printed circuits, germanium diodes, transistors and other precision parts. Manufacturer claims these features: instant heat, up to 1,250 F; adjustable heat control, 25 to 1,000 watts; low current consumption, ¼ amp standby, 6 amp at full load; special electrode tips to which solder will not adhere; timer mechanism (0-60 seconds) that is said to control duration of heat applied to work within split second.

VEMALINE PRODUCTS CO.

## Welding wire

**59** ALL oxides are said to be removed from "Spoolalloy" welding wire for automatic Mig (metal inert-gas) welding, thus eliminating main cause of poor arc and poor fusion. Wire is precision wound on specially developed machines. This "tensi-wind" step is claimed to eliminate possibility of kinks and insure a steady flow of wire to welding head.

Available in wide range of alloys including aluminum, Monel, Inconel, stainless steel, phos-bronze and high-carbon. Furnished on expendable spools and packaged in 25-lb units. Aluminum and aluminum-alloy wires are packaged on 10-lb spools.

PACIFIC WELDING ALLOYS MFG. CO.

* * *

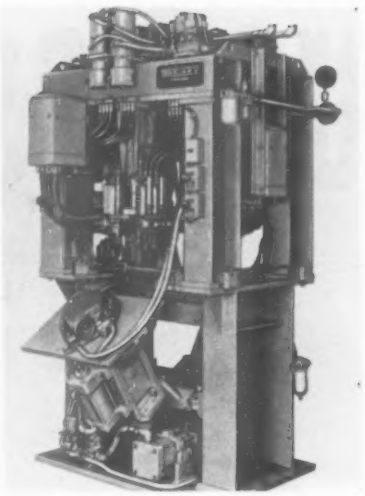
## Rectifier welder

**60** QUIET operation and low maintenance cost are claimed for new 300-amp, NEMA-rated, rectifier-type welder. Available is a full-time arc-force control for holding very short arcs with deep penetration, manufacturer states. Current range is 20 to 375 amp.

Offered as optional equipment, the automatic arc-force control provides an extra surge of current to blast away short-circuiting metal drops, which would otherwise freeze a short arc and cause sticking. Cooling for coils and rectifier stacks is provided by forced-draft ventilating fans. Designated "6WR30B," the welder is available for 220/440 or 550-volt operation.

GENERAL ELECTRIC CO.

**For more information use card on page 65**



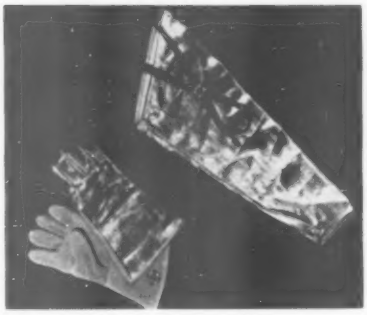
## Multiple-spot welder

**61** THIS multiple-electrode machine is for high-production resistance-welding applications. The "SX 36 G" consists of a universal multiple-gun base with two separate platen units. These units, operated independently, load in extended position—swing in and lift to welding position—and, after welding sequence is completed, retract and swing out for unloading. This lift and retraction feature is said to permit multiple-spot welding of deep-drawn sections.

Welding stroke of the guns is 1 in., and the effective cylinder area is 0.6 in. Maximum electrode force at 1,000-psi hydraulic pressure with a ¼-in. stroke is 600 lb; at 1-in. stroke it is 500 lb.

SCIAKY BROS., INC.

* * *



## Protective apparel

**62** NEW line of aluminized asbestos clothing includes gloves, leggings, aprons, helmets and complete suits. Garments are said to be highly pliable and have good durability and abrasion resistance. Aluminizing makes possible use of lighter weight asbestos. No "wetting down" is necessary. The coating is said to reflect 90% of all radiant energy.

WHEELER PROTECTIVE APPAREL.

This New

# COATED TUBE STOODITE

(STOODY 1293)

## Beats All for Shovel Protection!

**Longer service, less down-time at lower cost!**

STOODY'S new COATED TUBE STOODITE insures welding ease, welding speed and unusually good wear resistance! Bonds readily over most old hard-facing deposits, too! With all its advantages COATED TUBE STOODITE is a *low cost* hard-facing rod!

TRY 50 LBS. ON YOUR SHOVELS and other wearing equipment! Ask your welder about its running characteristics. Tested 2 full years (as Stoody 1293), this alloy is thoroughly field proven. Compare COATED TUBE STOODITE with rods of *any* price!

*Your Stoody dealer will help you. See the "yellow pages" in your phone book. Literature available.*

**STOODY COMPANY**

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CESIUM RADIOGRAPHY SOURCES

33-Year Half Life...Very Low Cost...Increased Contrast...Lighter and Less Expensive Containers

Tracerlab has reduced prices of its Cesium-137 sources up to 70%, because the AEC has reduced its cost, we are now buying in quantity, and are encapsulating popular sized sources for stock. Cesium is being increasingly used for radiography because of its lower energy radiation (0.60 MEV), which makes it ideal for thin steel sections and less dense metals such as aluminum, because better contrast is obtained. Additional advantages are its long life and the use of lighter shipping containers. 1 Curie source (3/16" x 1/8" active dimensions) only $275.00.

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## Simplified welding

**63** CLAIMED to be as easy as turning on a switch, a new method of welding may make it possible for "do-it-yourself" and hobby craftsmen to work with metals as readily as with wood. "Selfweld" method employs a special welding electrode and holder. To make a weld, the electrode tip is held against metals to be joined at point where the weld begins; a switch on the holder is pressed to fire the electrode; and, as the tip is held against the metal, the electrode automatically makes the weld itself.

The new 100-amp welder for use with the method is called the "Lincwelder 100." It can be operated safely on the properly fused electrical circuit of the average home or business establishment—either 115 or 230 volts. The method can also be used with welding equipment of types already in operation.

THE LINCOLN ELECTRIC CO.

* * *

## Thyratron tube

**64** DESIGNED for relay and servo-control applications, thyratron tube "Type AX5727" is a ruggedized version of the standard "type 2D21," according to manufacturer. It is an inert-gas-filled thyratron with negative control characteristics and is said to have a high control ration, which is stable over a wide temperature range.

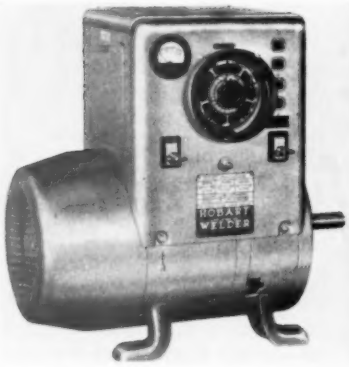
AMPEREX ELECTRONIC CORP.

* * *

## Air-control valves

**65** NEW line of air-control valves is designated as being of the "in-line" type. Manufacturer claims it is the first valve of its type to provide a fully enclosed solenoid and the first pilot-operated valve ever made to function efficiently down to 5 psi. Exhaust can be throttled for speed control. Conforms to J.I.C. design standards.

NUMATICS OPERATING VALVE.




## Welding generator

**66** THIS firm is now offering the generator only (less engine) of its combination a-c arc welder and a-c power plant in order that farmers and others who depend upon electric power for many purposes can make use of their own power source and save over the cost of a complete factory-built unit. Selector panel in conjunction with a standard control panel changes the generator from an arc welder to a 110/220-volt power plant.

When used as a power unit, it will provide 110-volt, single-phase, two-wire, 60-cycle alternating current or 220/110-volt, single-phase three-wire, 60-cycle alternating current. When used as an arc welder with the output selector panel in welding position, the generator makes available 60 to 80-volt alternating current, with reactor in circuit to insure excellent welding characteristics, manufacturer states.

HOBART BROTHERS CO.

* * *

## Ultrasonic cleaning

**67** HEAVY-duty, 2-kw ultrasonic power generator speeds up cleaning and degreasing of metal, plastics, etc. The 2,000-watt output of the "Sonogen" generator is fed into a barium titanate transducer at 100,000 cycles per second. The transducer, immersed in cleaning solvent, converts the radio frequency of 100,000 cycles per second into mechanical vibrations. This sets up a violent agitation in the solvent, shaking dirt and grease loose almost instantly, according to manufacturer.

The generator is cooled by forced air, measures 43 in. high by 23 in. wide by 18½ in. deep, and weighs approximately 350 lb.

BRANSON ULTRASONIC CO.

**For more information use card on page 65**

■ **can be applied to a wide range of materials**

Mild Steel • High and Low Carbon Steel • Cast Steel • Wrought Iron • Brass • Bronze • Copper • Grey Iron • Malleable Iron Castings.
Chrome and Nickel Cast Irons and many others

■ **easily and quickly applied**

Uniform and Easy Tinning.
Pre-heating or post-heating for stress relief are not necessary.
Low melting point.
Pre-cleaning can be eliminated with certain types of rods.
Bronze welds are easily machined.

■ **bronze welds are dependable in service**

Superior bonding properties • High strength • Excellent wear resistance • Corrosion resistant.

TITAN Bronze Welding Rods are supplied in several types to meet every requirement for oxy-acetylene welding. All are carefully deoxidized to assure ductile, high-strength, non-porous welds. Our general purpose rods are Double-Deoxidized by a patented process.

● *Write for Complete Information*

*Quality Alloys by Brass Specialists*

BRASS and BRONZE ROD • FORGINGS • DIE CASTINGS
WELDING RODS • WIRE

**Titan® METAL MANUFACTURING CO.**

Offices and Agencies in Principal Cities | General Offices and Plants: Bellefonte, Pa. ROD MILL DEPOTS: Bellefonte, Pa., Indianapolis, Ind.

**Q:** What controls the quality of consumable electrode welding?

**A:** One big factor is the quality of the electrode used.

**Q:** How can you be sure of getting the best electrode?

**A:** By insisting on Alcoa's new I.G.* Electrode.

**Q:** Why?

**A:** Every production lot of Alcoa® I.G. Electrode is test welded and the welds X-rayed for soundness. Each 10-lb spool is individually packed to maintain the super-smooth finish to assure soundness of weld and smoothness of feed. Each of three alloys, 1100, 4043 and 5154 (formerly 2S, 43S and A54S), is available in six diameters. There is no better electrode.

*inert gas

**ALCOA ALUMINUM**

ALUMINUM COMPANY OF AMERICA

A new, 176-page text, *Welding Alcoa Aluminum*, has just been released by Alcoa. It covers every phase of welding in complete detail. For a free copy, fill in and mail the coupon.

ALUMINUM COMPANY OF AMERICA
929-K Alcoa Bldg.
Pittsburgh 19, Pa.

Gentlemen: Please send book, *Welding Alcoa Aluminum*.

Name_____

Company_____

Title_____

Address_____ City_____ State_____

**Q.** Where is Alcoa's new I.G. Electrode available?

**A.** Contact your nearest Alcoa sales office, or, for immediate delivery, call one of the Alcoa Distributors listed below. He carries a complete range of alloys and sizes and you'll find him well qualified to work with your welding experts.

ALBANY, N. Y.
†Eastern Brace-Mueller-Huntley, Inc.

ATLANTA, GA.
†J. M. Tull Metal & Supply Co., Inc.

BALTIMORE, MD.
Whitehead Metal Products Co., Inc.

BIRMINGHAM, ALA.
†Hinkle Supply Co.

BOISE, IDAHO
Pacific Metal Co.

BUFFALO, N. Y.
Brace-Mueller-Huntley, Inc.
Whitehead Metal Products Co., Inc.

CAMBRIDGE, MASS.
Whitehead Metal Products Co., Inc.

CHARLOTTE, N. C.
Edgcomb Steel Co.

CHICAGO, ILL.
†Central Steel & Wire Company
†Steel Sales Corporation
Corey Steel Co.

CINCINNATI, OHIO
Williams & Co., Inc.

CLEVELAND, OHIO
†The Hamilton Steel Co.
Williams & Co., Inc.

COLUMBUS, OHIO
Williams & Co., Inc.

DALLAS, TEXAS
Metal Goods Corp.

DENVER, COLO.
Marsh Steel Corp.
Metal Goods Corp.

DETROIT, MICH.
Central Steel & Wire Co.
Steel Sales Co. of Mich.

HARRISON, N. J.
Whitehead Metal Products Co., Inc.

HOUSTON, TEXAS
Metal Goods Corp.

INDIANAPOLIS, IND.
Steel Sales Co. of Indiana, Inc.

JACKSONVILLE, FLA.
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†Marsh Steel Corp.
Metal Goods Corp.

LOS ANGELES, CALIF.
†Ducommun Metals & Supply Co.
Pacific Metals Co., Ltd.

LOUISVILLE, KY.
Williams & Co., Inc.

MIAMI, FLA.
Florida Metals, Inc.

MILFORD, CONN.
†Edgcomb Steel of New England, Inc.

MILWAUKEE, WIS.
Central Steel & Wire Co.
Steel Sales Co. of Wis.

MINNEAPOLIS, MINN.
Steel Sales Co. of Minnesota

NASHUA, N. H.
Edgcomb Steel of New England, Inc.

NEW ORLEANS, LA.
Metal Goods Corp.

NEW YORK, N. Y.
†Whitehead Metal Products Co., Inc.

PHILADELPHIA, PA.
†Edgcomb Steel Co.
Whitehead Metal Products Co., Inc.

PITTSBURGH, PA.
†Williams & Co., Inc.

PORTLAND, ORE.
†Pacific Metal Co.

ROCHESTER, N. Y.
Brace-Mueller-Huntley, Inc.

ST. LOUIS, MO.
†Metal Goods Corp.

SALT LAKE CITY, UTAH
Pacific Metals Co., Ltd.

SAN DIEGO, CALIF.
Ducommun Metals & Supply Co.

SAN FRANCISCO, CALIF.
†Pacific Metals Co., Ltd.

SEATTLE, WASH.
Pacific Metal Co.

SYRACUSE, N. Y.
†Brace-Mueller-Huntley, Inc.
Whitehead Metal Products Co., Inc.

TAMPA, FLA.
†Florida Metals, Inc.

TOLEDO, OHIO
Williams & Co., Inc.

TULSA, OKLA.
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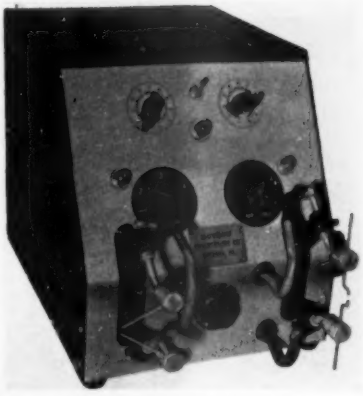
YORK, PA.
Edgcomb Steel Co.

†Home Office

## Dual-head welder

**68** SMALL-parts resistance welder with dual heads can be quickly and independently adjusted for pressure, time and heat in progressive assembly work, according to manufacturer. Electrodes and holders are adjustable in all directions.

Package unit contains welding heads, timers, controls and transformer in specially constructed cabinet. Welder handles strip and wires up to 1/32 in. Two foot pedals and chains are included, and special holders and fixtures can be provided. One-kva unit operates from conventional 220-volt, 60-cycle, single-phase outlet.

ROYSON ENGINEERING.

* * *

## Disc grinder

**69** FEATURES of new air-powered disc grinder are said to open for portable hand grinders a wide field of application formerly restricted to stationary machine tools or even completely outside the scope of grinding. According to manufacturer, hand grinding with the "LSS 81" replaces chipping and machine cutting of bevel joints before welding, dressing of welds and wire-brush cleaning.

The nylon-reinforced hub wheel requires higher speed and power than were formerly available in hand grinders. The "LSS 81" will drive a 7-in. hub wheel at 8,000 rpm, developing 2.6 hp. Since the machine weighs only 11 lb, this gives a good power-weight ratio. Safety features include a governor, trigger handle, spark guard. Manufactured by Atlas-Diesel Co., of England, whose U. S. agent is

COPCO EASTERN LTD.

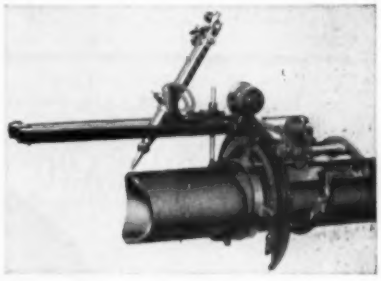
*—McGraw-Hill World News*

**For more information use card on page 65**


CONTOUR CUTTING

**Doesn't have to be a hair pulling proposition!**

Yeh, Joe won the contract all right . . . the whole ding-blasted works . . . miles and miles of pipe fabrication and some of the darndest shapes to cut you ever saw! Joe lost money on that job. Oh sure, he made a profit, but he could have made more — lots more — with the H & M Shape-Cutter and Beveler. Joe didn't know it but the H & M could have saved **90% of his time** on those contour cutting problems. With the H & M Shape-Cutter all you do is attach the desired cutting pattern to the machine . . . slip the machine over the pipe and snap in place . . . light the torch . . . give the hand crank a few turns . . . and the job is done — the maximum SPEED WITH ACCURACY. Joe had a few choice words for those reject welds too . . . the H & M certainly could have saved him a lot of fuss and bother. If you're in the same fix as Joe get all the details . . .



WRITE FOR THE FREE FOLDER
**"MORE PROFIT DOLLARS IN PIPE FABRICATION"**

H & M PIPE BEVELING MACHINE CO.

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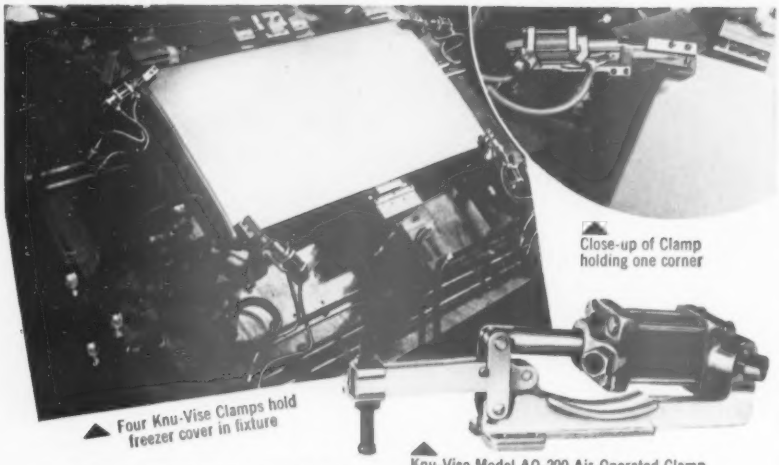
Close-up of Clamp holding one corner
Four Knu-Vise Clamps hold freezer cover in fixture
Knu-Vise Model AO-200 Air-Operated Clamp

**AIR-OPERATED TOGGLE CLAMPS IN AUTOMATION:**

Here is a good example of how an air toggle clamp fits into the automatic sequence of piercing and notching. Four Knu-Vise air-operated toggle clamps, Model AO-200, are used to clamp and release a large freezer cover automatically, increasing efficiency and economy. Failure of air pressure will not release the clamps, thus eliminating a possibility of scrappage. This operation is a daily performance at Ben-Hur Mfg. Co., Milwaukee, Wisc., and is only one of the many applications to increase production there and in scores of other industries. Perhaps there is a clamping method in your plant that we can make easier and faster. Send for catalog.

Sales offices in principal cities—Teletype DE 49

**KNU-VISE PRODUCTS** **LAPEER MANUFACTURING CO.**

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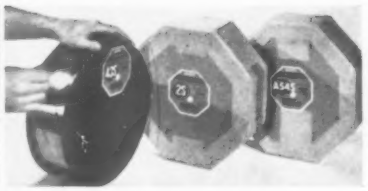

## Mig electrode

**70** CONSUMABLE aluminum electrode is designed for use in welding guns employed in Mig (metal inert-gas) processes. Called "Alcoa I. G.," it can also be used for tungsten-arc welding where filler wire is fed mechanically to the work.

The new electrode is current being produced from three aluminum alloys —2S, 43S and A54S. It is packaged and stocked on non-returnable fibre spools in diameter sizes of 0.030, 0.050, 3/64, 1/16, 3/32 and ⅛ in. Each spool contains 10 lb. Electrode conforms to AWS Specification A5.10-54T (tentative 3/17/54) and ASTM Specification B-285-54T.

ALUMINUM CO. OF AMERICA.

* * *

## Welding table

**71** "VENT-A-WELD" welding table is said to provide a large, rugged work surface and at same time draw out and exhaust to outer air all smoke and fumes from the operation. It can be connected to an electrostatic filter, thus conserving heat where state laws permit re-use of filtered air.

PAPEC MACHINE CO.

* * *

## Welding rod

**72** EXTRUDED white-metal rod, "Oxweld No. 49," is for low-temperature oxyacetylene welding of die castings. It is said to flow smoothly and fuse readily without flux or excessive puddling. Welds made with it in zinc-base alloys are clean and uniform and are claimed to have greater strength than the original cast metal. The rod can also be used on most aluminum- and magnesium-base die-cast alloys.

LINDE AIR PRODUCTS CO.

## Sanitizing agent

**73** CONCENTRATE, which can be mixed instantly with water, is claimed to form an effective disinfectant for sanitizing all types of safety glasses, goggles and respirators that are not harmed by water itself. The concentrate is non-irritating to skin and non-toxic in normal use, manufacturer states. Washed articles need not be rinsed—best results are obtained by air drying.

Available in 6-oz metered bottles, one of which will produce 24 gal of the disinfectant.

CHICAGO EYE SHIELD CO.

* * *

## Abrasive wheel

**74** REGULAR hard-resin wheel has been reinforced to take extreme peripheral as well as side bending or wedging stresses, according to manufacturer. Designated "Saftex," it is made as a straight wheel in thicknesses of ⅛ to 1 in. and in diameters from 3 to 12 in. Also available in 7 and 9-in. diameters as depressed-center discs in ⅛, 3/16, ¼ and ⅜-in. thicknesses for use on right-angle grinders.

METAL REMOVAL CO.

* * *

## Wet-blast machine

**75** FOR use in deburring, surface finishing and similar work, "Model 34" wet-blasting machine is said to give metals a finer finish, and hold closer tolerances. A new vertical-type pump has a chrome-plated impeller and shaft that, it is claimed, will outwear other type pumps for wet-blast equipment. Manufacturer states that the hopper is built so that a complete change-over of abrasive is cut to a minimum.

WET-BLAST MFG. CO., INC.

* * *

## Vapor collector

**76** INCREASED suction and a self-clearing, paddle-wheel-type fan that can handle solids from wet machining operations are features of recent changes made in "Model VCS-2" vapor collector. New rating is 614 cfm with a 5-in. inlet, which is developed by the fan being direct driven by a 1/3-hp, continuous-duty motor. Mounting space required is 28 by 28 by 28 in.

AGET-DETROIT CO.

**For more information use card on page 65**

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***...just overlay the worn surfaces with wear-resistant, corrosion-resistant* AMPCO - TRODE***

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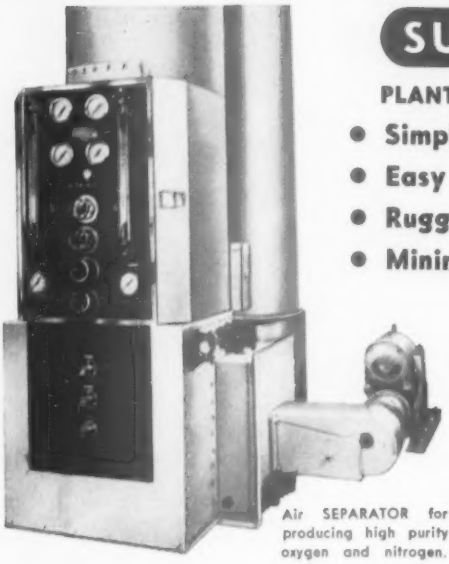
W-139

# Oxygen-Nitrogen from Air



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DIAL SET 45°

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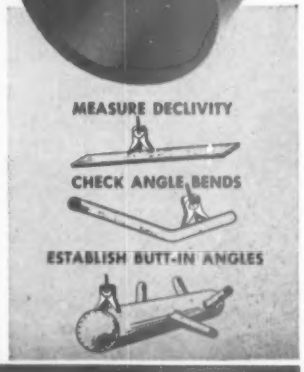
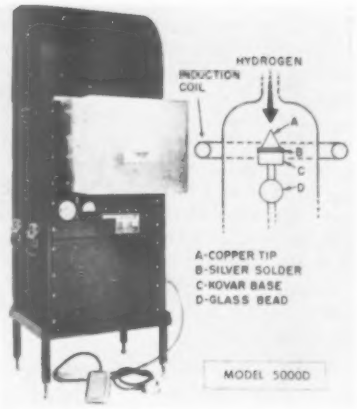



**Boyce CENTERING HEAD**


## Induction heater

**77** HIGH-speed, high-frequency induction heater provides its own controlled hydrogen atmosphere. Typical applications: welding, brazing, soldering, hardening and annealing. Manufacturer claims the secret of the heater's speed is in the design of its heavy-duty capacitor. The all-aluminum capacitor is said to discharge completely, retaining none of the residual charge.

RADIO FREQUENCY CO.

* * *

## Table-type blaster

**78** INTENDED for cleaning weldments, castings, etc., a new airless blasting machine has a 72-in.-diameter worktable mounted on the door. When door is open, table comes out of machine for easy loading; when the door is shut, table automatically moves into blasting zone and rotates work under abrasive blasts from a rotating bladed wheel mounted in the cabinet roof. Pit for the abrasive hopper is not required. Machine has a 40-in. work height clearance.

AMERICAN WHEELABRATOR & EQUIPMENT CORP.

* * *

## Saw-blade welder

**79** LATEST models of this portable band-saw blade welder incorporate a special forging action called "Vibra-Forge," which achieves such a secure weld, manufacturer claims, that blades will no longer break at the weld. As two ends of the blade are brought together by the jaws, a hammering or forging action is produced, resulting in a stronger weld. Unit welds blades up to $\frac{3}{4}$ in., weighs only 35 lb. It operates on 110 volts, a-c, 60 cycles. Made by Brennen, Bucci & Weber, Inc.

KASSON DIE & MOTOR CORP.

## NEW PRODUCT BRIEFS

**80** **Full**-encirclement saddle is said to represent a marked improvement over conventional saddles used in "hot tapping" petroleum piping. It is split longitudinally, on a horizontal plane, perpendicular to the axis of the outlet, thus eliminating welds in the critical crotch area. TUBE TURNS.

* * *

**81** **Portable** power pipe saw is for on-the-job cutting of 2 to 8-in. cast-iron and steel pipe as well as bar stock and beams. Weighs 120 lb. THE E. H. WACHS CO.

* * *

**82** **Alkaline**-type material, "Composition No. 161," is designed for cleaning aluminum, steel and other metals in pressure-spray washing machines without objectionable foaming. OAKITE PRODUCTS, INC.

* * *

**83** **Improved** fluorescent "Blak-Ray" (black light) lamp is designed for use in difficult inspection procedures, in flaw detection and other manufacturing operations. ULTRA-VIOLET PRODUCTS, INC.

* * *

**84** **Automatic** air-line lubricators are installed in compressed-air lines and inject an oil mist into the air stream to lubricate air cylinders, air tools and other air-operated equipment. GENERANT ENGINEERING CO.

* * *

**85** **Made** of high-tensile, malleable iron, "Autoset" clamp is designed to keep lines of force always at right angle to the work, the table and the washer, providing greatest possible clamping strength. THE CUSTANITE CORP.

* * *

**86** **Coiling** machine "No. 1200" measures and coils heavy wire, cable cordage, hose or any material that can be coiled. Wire runs through measuring meter to give exact number of feet wound or paid out of reel. NEAL CO.

* * *

**87** **Thickness** of metals, rigid plastics, etc. is indicated on 21-in. television tube, which allows for scales 17 in. long, in "Vidigage," an automatic ultrasonic instrument. BRANSON INSTRUMENTS, INC.

**For more information use card on page 65**

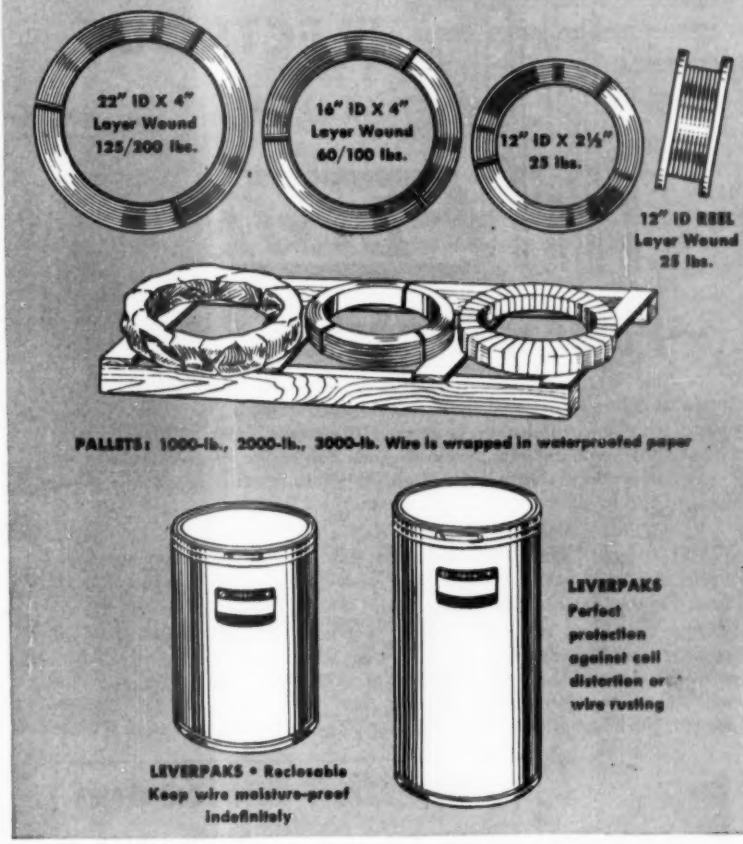

# Page Welding Wire

**PAGE CHECK-OFF**

*Check the welding wire you use:*

- Heavy submerged arc
- Light manual submerged arc
- Inert gas manual or automatic

**HOW TO BUY IT**


22" ID X 4" Layer Wound 125/200 lbs.
16" ID X 4" Layer Wound 60/100 lbs.
12" ID X 2½" 25 lbs.
12" ID REEL Layer Wound 25 lbs.
PALLETS: 1000-lb., 2000-lb., 3000-lb. Wire is wrapped in waterproofed paper
LEVERPAKS • Reclosable Keep wire moisture-proof indefinitely
LEVERPAKS Perfect protection against coil distortion or wire rusting

**CARBON STEEL** • Any carbon from Armco (.025 max.) to high carbon (.90-1.10). All standard AISI analyses in between.

**LOW ALLOYS** • All the most popular welding grades.

**STAINLESS** • AISI—308, 309, 310, 316, 347, 410, 420, 430 and 502. Other types on request.

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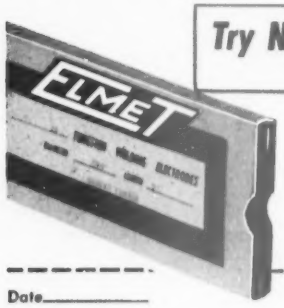
—Pioneer Tungsten Producer

Here at last are pure and thoriated tungsten welding electrodes you can depend upon for uniformly superior performance. ELMET Efficiency Electrodes are manufactured by North American Philips, one of the pioneer tungsten producers with more than 20 years experience in this highly specialized field.

For purity, efficiency, reliability and perfect mechanical conditions, ELMET Tungsten Electrodes will meet your severest requirements. Their uniformity of properties, dimensions and characteristics prevent loss of time due to readjustments of equipment and voltage.

Rod diameters are held within specified diameters and limits of straightness, thus assuring good fit and uniform feed adjustment. Furnished in cleaned finish and centerless ground finish. Available in packages of 10 in all standard diameters from .040" to ¼" and from 3" to 18" in length. North American Philips Co., Inc., Elmet Division, Lewiston, Maine.

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☐ *Price on* _____ *Elmet Electrodes.*
(quantity, size, finish)

Name_____

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☐ *Send me your distributor proposal.*


**88** **Eighteen** assorted electrical test clips and insulators now come mounted on 7 by 9 in. display board. Larger board displays 42 items. MUELLER ELECTRIC CO.

* * *

**89** **Self-cleaning** dust collector, "Cyclo-Filter," is designed for heavy duty. Will handle quantities of all types of dust, including abrasive and fibrous materials, for long periods. TORIT MFG. CO.

* * *

**90** **Eye** and face protection for wearers of safety hard hats is afforded by new lumerith acetate clip-on and swing-back face shield. E. D. BULLARD CO.

* * *

**91** **Fingertip** speed control is feature of improved "Nu-Jett" pencil grinder that weighs just under 6 oz. Collet guard is said to eliminate possibility of using oversize mounted point or cutting tool in grinder, as well as protect fingers from skin burn. AIR EQUIPMENT CORP.

* * *

**92** **Industries** that prefer metal head protection may now establish a hard-hat color code with this firm's new aluminum, non-fading, metallic-colored safety hats and caps. Produced with special metal dyes, two models are available in yellow gold, bronze, blue, grey, green and the standard, silver. E. D. BULLARD CO.

* * *

**93** **Lockout** device for electric switch and fuse boxes is used as a safety procedure. It allows up to six padlocks so that where a number of men are working on the operation, current may not be turned on until last man has completed his work and removed his lock. INDUSTRIAL PRODUCTS CO.

* * *

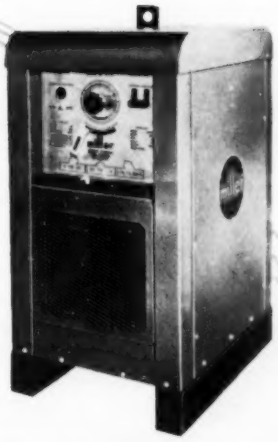
**94** **Motor** truck may now be loaded or unloaded from ground level with new portable loading dock, with capacity of 6,000 lb. Its battery or a-c powered hydraulic elevating mechanism will raise loads to maximum height of 56 in. THE RAYMOND CORP.

* * *

**95** **Lightweight** radiation detector "PW 4010" that easily fits into man's pocket is useful for measuring radiation exposure of laboratory workers and for checking intensity levels during research investigations. NORTH AMERICAN PHILIPS CO., INC.

## Miller Selenium Rectifier Type D.C. Arc Welders

. . . performance, dependability, ease of maintenance unmatched by any other! *Pulsating* direct current produces sounder, denser welds; minimizes magnetic arc blow and "arc-outs." SR Welders have wider ranges than any other D.C. welder; polarity reverses at the flick of a switch. Miller's patented UNITRAN *combines* transformer and flux diverter. Easily remote controlled or paralleled in combination with other SRs. Models with rated outputs (60% duty cycle at 40 volts) of 200, 300, 400 and 600 amperes.



## Miller Heavy-Duty Industrial A.C. Arc Welders

These transformer-type welders achieve high-quality welds at maximum production speeds, feature low maintenance and long life. Ample open circuit voltage stabilizes arc, minimizes "arc-out" time, permits use of all A.C. or A.C.-D.C. electrodes. Continuous current control. Models 102, 103, 104, 105 and 106 rated at 200, 300, 400, 500 and 600 amperes respectively (60% duty cycle at 40 volts). Power factor correction at slight additional cost. Models 105-SA, 107-SA, 108-SA and 109-SA are specifically designed for submerged arc welding, have selective open circuit voltages for automatic welding. Rated secondary amperes (60% duty cycle at 40 volts) are 500, 750, 1000 and 1500 respectively. All SA models are power factor corrected.

## 20% PLUS FACTOR

Engineer-earned designator for the basically better design, high-quality components, established efficiency and longer life of Miller welders. Complete FREE literature upon request. Get the facts TODAY!

## Miller Constant Potential Rectifier Type Sigma Welder

Model SIGMA-5 maintains stable welding conditions regardless of arc variations. Operator can set wire feeding speed on SIGMA head and arc voltage on SIGMA welder. After arc is struck, Model SIGMA-5 automatically regulates filler wire speed and current to maintain constant arc length. Power for SIGMA head and control circuit furnished from within welder. May be paralleled and/or remote controlled. 500 ampere rated output on 100% duty cycle at 30 volts.

miller

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IS YOUR ARC WELDING
CURRENTLY ANEMIC?
Many companies supply top quality arc welding machines and top quality electrodes to do a top welding job but miss one extremely important point . . .
. . . The performance in the arc is entirely dependent upon the cables and accessories that bring the welding current to the electrode from the machine's terminals.
Is your arc current starved due to poor connections at lugs, quick connectors, grounds and in holders?
Do your operators have to stop occasionally to cool off electrode holders due to hot handles caused by poor connections or use two holders where one should do the job?
Does your weld quality suffer due to volt and amperage variations during the welding cycle?
You can eliminate these troubles. Just specify CADDY Accessories and cable splices using 100% solid copper CADWELD connections throughout.
CADDY alone gives you a 100% Copper Circuit from the power line through the welding machine right to the electrode.
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WRITE TODAY FOR NEW 1955 CADDY CATALOG

Letters should be addressed to: The Editor, WELDING ENGINEER, 330 W. 42nd St., New York 36, N. Y. No letter will be published unless signed, but your name will be withheld if you request it.

### Kudos for August editorial

Dear Sir:

I was indeed impressed with your editorial in the August issue of WELDING ENGINEER ("A tale of three cities").

This particular editorial can be of considerable help to me in convincing some of those manufacturers who are under the false impression Kansas City is backwoods country. Many fail to understand the real purpose behind the activity.

I have in mind reproducing your editorial, giving due credit, and mailing it to several prospects as a follow up to our first announcement. Of course, this would be done only with your permission. In my way of thinking, this is the best sales tool thus far produced.

Cordially yours,
Robert T. Kenworthy
Trade Exposition Management
New York City 17

Dear Sir:

Please accept the appreciation of the American Welding Society for your fine editorial, which contained a vitally important message regarding the AWS all-welding show, in your August, 1954, issue.

It is the belief of our Society, as expressed through the actions of its committees, that the welding industry should invest in its future by pushing ever forward the frontiers of welding knowledge service and use. To do this will require that at least every other year the strength accumulated from the profitable returns of the previous year be used for advancing these frontiers just a little more.

It is human nature to be wary of new moves in a new direction. First, industry, as pointed out in your editorial, feared making the first move —the all-welding show. Now a certain portion of industry is reluctant to move from the locations where

*RESULTS OF AN INTELLECTUAL REVOLUTION . . .*

# "The Western Miracle" Continues . . . More Automatic Controls for Industry

Within recent weeks three new monthly technical magazines devoted to automatic control systems for industrial processes and machinery have offered the public their first issues. One of these is CONTROL ENGINEERING, a McGraw-Hill publication.

What has caused this surge of interest in the design and application of automatic control systems? What does it portend for the future of American industry? More important, what does it promise for the American standard of living, of which industry is and must be the servant? And what is the role of CONTROL ENGINEERING in this development? It is to those questions that this statement is addressed.

## A New Intellectual Revolution

It is frequently asserted that we are now in the throes of a new industrial revolution. The revolution is described as the eliminating of wasteful applications of human labor to repetitive tasks through new technology which makes it possible to transfer those tasks to automatically controlled machinery.

It is perhaps more accurate, however, to say that we are the beneficiaries of a new intellectual revolution in the application of science to industry. This new intellectual revolution points the way toward giant strides in the continuing process of taking dull and laborious work off the backs and minds of men and transferring it to machines operating in large batteries under automatic control.

The practical engineering work required to convert this intellectual revolution into a full-scale industrial revolution, however, in large part still remains to be done. It is to this task that CONTROL ENGINEERING will be devoted. Its role is that of bridging the gap, in engineering and economic terms, between the new conceptions of automatic control of industrial processes and their practical workaday application. These conceptions run the full gamut from systems of control for automatic factories making heavy industrial products to highly personalized systems of automatic control to warn people when they are approaching the broiling point in sunning themselves at the beach or becoming too drowsy to drive their cars safely.

## Enter the "Feed-Back" System

Enough work has been done to move these conceptions out of the realm of interesting dreams and into the realm of practical possibilities, and in some cases into the realm of practical realities. Crucial parts of this work were done during World War II when weapons were successfully equipped with "feed-back" systems

that automatically corrected mistakes made by the weapons in locating their targets.

The principle of the "feed-back" system is as ancient as the personal monitor that tells us not to run into each other as we walk along the street. It feeds back to our locomotion machinery the warning of a collision ahead. But the application of the principle to weapon control and then to more general machinery control required superlatively imaginative and skillful scientific development.

When a "feed-back" system that monitors an automatic process and keeps it lined up precisely is teamed up with a computing machine, capable of making lightning calculations that control both what goes into the process and what is done with the product, the horizons of automatic control become broad indeed. But in large part they still remain horizons. A vast range of practical engineering work remains to be done to realize anything like the full potential of automatic control of industrial processes and machinery.

## More and Better Jobs

There are those who view the surge of interest in automatic control with alarm. They conjure up a situation in which automatic processes will at once expand the ranks of the unemployed and reduce many of those still working in industry to the status of robots or automatons.

A look at the record of the American economy — a record of amazing growth, steadily improving job opportunities and a constantly rising standard of living — demolishes the basis for such fears. The introduction of new and more efficient industrial machinery and processes obviously cannot be accomplished without creating some disturbance for some individuals and some companies. But consistently the longer range effect of such local and temporary disturbance has been more jobs and better jobs for Americans.

It is no accident that, while the proportion of industrial wage earners in our population is virtually the same as it was in 1920, the proportion of professional and salaried workers has doubled. The proportion of unskilled workers, furthermore, has dropped by half. This has been an essential part of a continuing process by which drudgery has been transferred to machines while the workers who formerly did the drudgery have been graduated to jobs calling for greater competence and providing better pay.

## Higher Living Standard

A British historian, H. J. Hancock, has referred to this general process as "the Western miracle" — that of providing an ever higher and higher standard of living for more and more Americans. The key element in this miracle has been more and more reliance on power-driven machines to get the day's work done.

In the nature of the extremely complicated apparatus involved, full development of systems which have passed through the "think stage" into the status of practical possibilities will be a time-consuming process. It will also be a very exacting process, calling for a tremendous application of engineering skill and ingenuity. However, the engineers who are concentrating on this difficult, workaday phase of the development of apparatus for automatic control will be inspired by the knowledge that they are making a crucial contribution to technical progress which holds great promise of good for the American people.

*This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nationwide developments that are of particular concern to the business and professional community served by our industrial and technical publications.*

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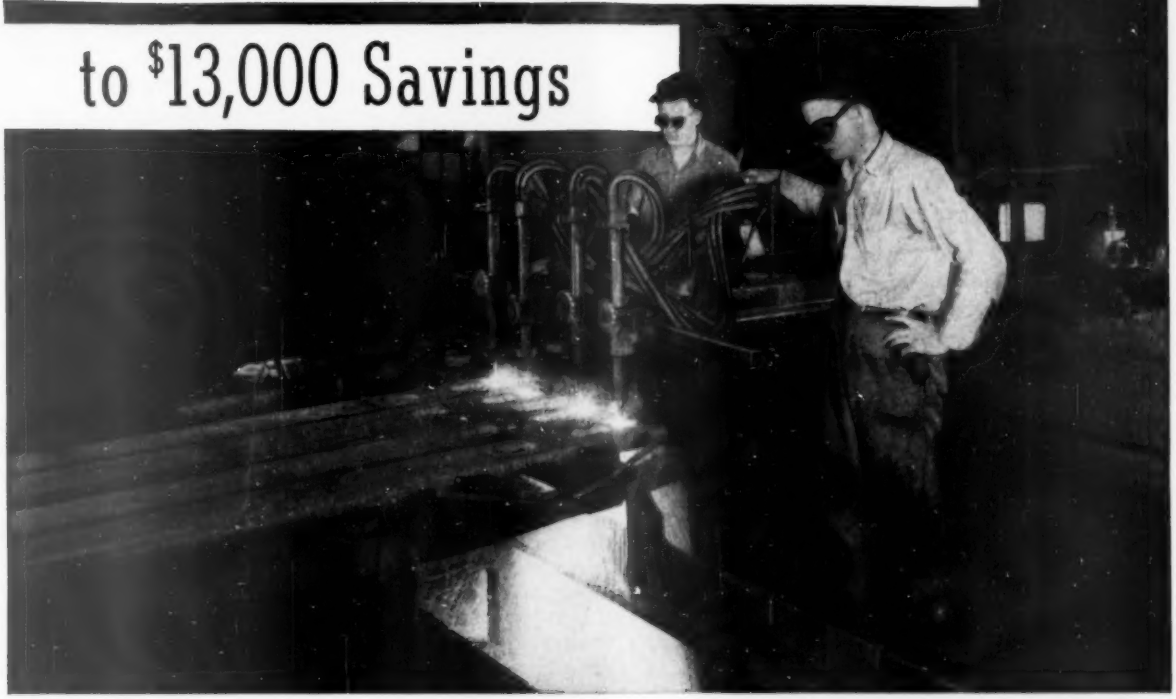
Donald C. McGraw

PRESIDENT

McGRAW-HILL PUBLISHING COMPANY, INC.

# Machine-Cutting Clears the Way to $13,000 Savings

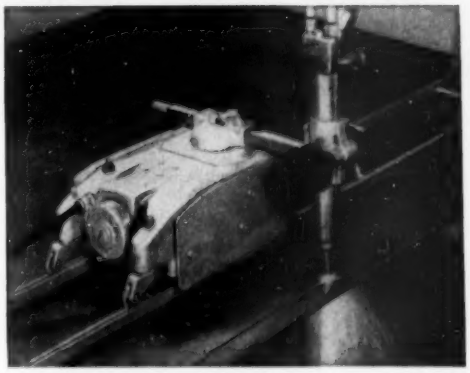


One steel company is saving up to $13,000 a year by using oxygen shape-cutting machines for making ingot and pan links from steel plate.

Previously these parts were forged at an annual cost of approximately $30,000. The speed and accuracy of oxygen shape-cutting cut costs to $17,000 a year—a savings of more than two dollars on each of the 5,000 parts made.

Machine-cutting setups are speeding fabrication and cutting costs throughout industry. Whatever your part-producing needs are—cutting hundreds of parts at one time, or one-of-a-kind turnout—there are LINDE oxygen shape-cutting machines to help you save hours and dollars in production time.

LINDE service engineers will be glad to help you determine the shape-cutting setup to best serve your job needs. Call your local LINDE representative for more information. Start saving now—call him today.



*This lightweight portable cutting machine weighs only 38-lbs., and can cut metals up to 10-in. thick. It can cut straight lines, circles, and plate edge preparations in from 4-in. to 32-in. per minute.*

**Linde Air Products Company**

**A Division of Union Carbide and Carbon Corporation**

30 East 42nd Street UCC New York 17, N. Y.

Offices in Other Principal Cities
In Canada: DOMINION OXYGEN COMPANY
Division of Union Carbide Canada Limited, Toronto

Linde Trade-Mark

*"Heliarc," "Unionmelt," and "Linde" are registered trade-marks of Union Carbide and Carbon Corporation.*

"Let's call in T.W."
"ONE OF THEIR STANDARD RESISTANCE WELDERS COULD BE THE ANSWER"
● Like any other commodity, when you buy a standard resistance welder instead of a special, you save money and get shorter delivery.
Perhaps you have been thinking in terms of a "special" welder when a standard might do the job. T-W is a logical source because they make more standard spot, seam, flash-butt and projection welders than any other manufacturer, in addition to a wide variety of special welders.
From T-W, you can receive the necessary data on which to base a decision, such as: a comparison of a standard and a special; power requirements (three-phase or single phase); rates of production; welding cost per unit of production; installation recommendations.
Outline your needs to the nearest T-W sales office or the home base in Warren, Ohio. Prompt reply to your inquiry.
Resistance Welders Since 1898
Sales and Service
CHARLOTTE • CHATTANOOGA
CHICAGO • CLEVELAND • DALLAS
DAYTON • DENVER • DETROIT
LOS ANGELES • PHILADELPHIA
PORTLAND, OREGON • SEATTLE
ST. LOUIS • STAMFORD • WASHINGTON
OAKVILLE AND WINDSOR, ONTARIO
TAYLOR-WINFIELD
RESISTANCE WELDERS
THE TAYLOR-WINFIELD CORPORATION • WARREN, OHIO

they have had the greatest success. We firmly believe that the results to be experienced at Kansas City will convince many that pushing ever outwards with the welding story will be profitable.

Sincerely,
J. G. Magrath
Secretary
American Welding Society
New York City 18

* * *

### They were sent

Dear Sir:

The Penn Metal Co. would very much like to send a copy of your August issue to each of our sales offices and structural sections managers, and for this purpose we would like to purchase 20 copies as soon as possible.

There has been considerable interest shown in this article. You have done a terrific job.

Yours very truly,
Frank F. Ransome
Penn Metal Co., Inc.
New York City 17

*Article referred to is "It's here: A welded steel home," beginning on page 17, August, 1954,* WELDING ENGINEER.

Dear Sir:

I read with great interest your review on the different papers of the welding convention in Buffalo, including the note on the paper of procedure control and research as applied to welding processes. Would it be possible for you to send us two copies or tear sheets of the review in the July issue?

I would also like an extra copy or tear sheet of the second part of Preston Hall's article on the history of resistance welding, which appeared in the March issue of WELDING ENGINEER.

Very sincerely yours,
Warner H. Simon
Welding Engineer
Dresser Mfg. Div.
Dresser Industries, Inc.
Bradford, Pa.

* * *

### Welded house again

Dear Sir:

I have read with much interest your article in the August issue of WELDING ENGINEER on a welded steel home. I do considerable welding and steel fabricating in my business and am just before building a new home. I have debated some time on whether to use steel or wood framing. I think steel can be used successfully and would like to see it introduced in this area.

# AUTOMATIC TORCHES

## THE HEART OF ECONOMY

*Approved by Underwriters' Laboratories*

### BY ACTUAL COMPARISON

**USING NON-AUTOMATIC TORCH . . . . . 12 Pieces Welded**
**USING NON-AUTOMATIC WITH GAS SAVER . . 18 Pieces Welded**
**USING HARRIS AUTOMATIC TORCH . . . . 28 Pieces Welded**

Using the same amount of Oxygen and Acetylene for each set-up, this "Actual Comparison" Demonstration proved the Harris Automatic Torch to be a profitable investment for economical and efficient welding work.

Let our local Distributor show you the "Actual Comparison" test in your plant and explain quickly and simply why the Harris Automatic has the greater piece production at the lowest cost.

### ALMOST 50 YEARS OF "KNOW-HOW"

Harris is the originator of the "Automatic" Torch and with almost 50 years of building "Know-How" behind every torch, the buyers and users get tremendous returns on their torch investment.

Harris' long established Distributors, located in all principal cities in the United States and Foreign Countries, are at your service.

**HOME OF AMERICA'S FIRST AND FINEST GAS WELDING AND CUTTING APPARATUS.**

## THE HARRIS CALORIFIC COMPANY

*Cleveland 2, Ohio*

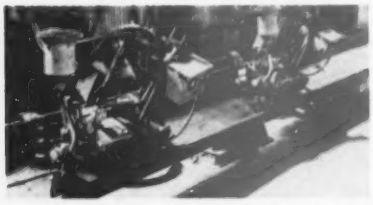
HARRIS

SERVING THE METAL INDUSTRY SINCE 1905

SIGMA welding on aluminum with 500 amp. GLENN CV Welder. Constant-voltage simplifies, improves MIG welding of all types — ideal for new SIGMA tack and spot weld techniques.

## Constant Voltage Power Source Takes Variables Out of Automatic Welding

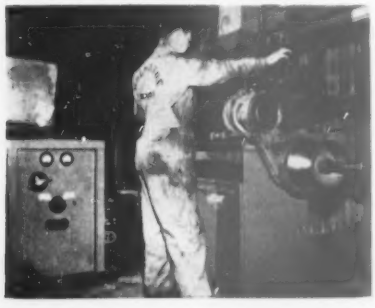
The headaches of automatic welding with old-style power sources — variable voltage, variable feed, variable results — can be eliminated with GLENN Constant Voltage Welders. They deliver a fixed d.c. pre-set arc voltage permitting fixed feed rate and uniform deposit — even when tack-welds or poor fit-ups are encountered.



SUBMERGED ARC—GLENN-powered dual heads make 60' fillet weld; "erase" tacks, leave perfect full-length bead.

SEMI-AUTOMATIC—GLENN CV Welder instant arc start and recovery makes it simple, easy!

HARD FACING with GLENN CV power means smoother, more uniform deposits.



### OTHER BENEFITS

Modernizing with GLENN CV Welders provides simplicity of control and operation, uniform high-quality welds with fewer rejects. Faster production schedules and far lower welding costs result. Efficiency is 85% or better, power factor 90% or better at all outputs — you can double the welding capacity of your present motor-generator or transformer supply without re-wiring!

### JOB PROVED

GLENN CV Welders are the original — and only — constant voltage power sources job-proved for more than a year on submerged arc, inert gas, "squirt," automatic stud welding, Arcair cutting and gouging. They've licked tough control problems on 3 o'clock and field welding jobs, on pipe mills, roundabout and long seam welds. They've simplified welding on aluminum, copper, stainless, mild and alloy steels.

### COMPLETE LINE

GLENN CV Welders are available in 3 models with continuous-duty ratings of 500, 750 and 1200 amperes, 18-42 volt arc voltages. They operate from 3-phase a.c. power supplies in all common line voltages.

3 *Get the facts now. Write*

**GLENN COMPANY**

**3134 East 10th Street, Oakland 1, California**

**or 10222 Avenue N, Chicago 17, Illinois**


It has been used extensively in the commercial field but not in residential. Your article has come at an opportune time to further my ideas and also to furnish sources of additional information.

Yours truly,
J. Lewis Bryan
Bryan's Repair Shop
Lumberton, N. C.

* * *

**Welding mild steel**

Dear Sir:

In a recent issue of WELDING ENGINEER, you mention the use of semi-automatic welding with magnetic flux in conjunction with *mild steel* welding. May I ask you for some information on the wire, flux and application details concerning horizontal and vertical position welding?

Very truly yours,
A. Shumovsky
Welding Engineer
Vulcan Iron &
Engineering Ltd.
Winnipeg, Canada

*For information on this new development, we suggest you get in touch with American Manganese Steel Division, Chicago Heights, Ill. Also, look for an article on the method to appear in next month's* WELDING ENGINEER.

* * *

**"Slag-gas . . ." welding**

Dear Sir:

The article on slag-gas-shielded arc welding that appeared in the July issue of WELDING ENGINEER was very interesting to us. If possible, we would like to receive any further information, data or specifications that might be available on this process. Also we would like the address of Bernard Welding Equipment Co., developer of the method.

Very truly yours,
Evert W. Freeman
Plant Engineer
Brown & Sharpe Mfg. Co.
Providence 1, R. I.

*For further information, get in touch with the Bernard firm at 10232 S. Avenue N, Chicago 17.*

* * *

**More comprehensive tests**

Dear Sir:

I was very much interested in one particular article in the July issue of WELDING ENGINEER and cannot resist the temptation to comment. The article in question is entitled "Tested and found wanting," authored by Jacobs and Marschall.

Usually I find little to criticize in scientific papers published in WELDING ENGINEER and other welding pub-

NEW!

# SPOT WELD without jigs or back-up plates

***Now you can spot weld with complete maneuverability — and as fast as you can pull the trigger — with the new portable AIRCOSPOT® Gun.***

With **AIRCOSPOT,** Air Reduction's new inert-gas-shielded spot welding unit, you simply touch the water-cooled gun to one side of the work and pull the trigger. In about a second you have a spot weld. It will be a good one, too, because **AIRCOSPOT'S** inert gas shield completely protects the hot metal from contamination by the air.

Write today for prices and folder that provides detailed information.

**AIRCOSPOT welds all sheet steels** — including stainless up to 3/32"—to bottom sections of varying thickness.

**AIRCOSPOT is fast.** Once the controls are set, you can make thirty or more welds a minute.

**AIRCOSPOT is easy to use.** Operators need no special training. The welding cycle is fully automatic.

**AIRCOSPOT is handy.** Gun weighs four pounds, is nine inches long. All connections—current, gas and water—are through a single control panel.

**AIRCOSPOT is rugged.** No abuse-sensitive high frequency or electronic circuits, because Gun is of electromechanical design.

***at the frontiers of progress you'll find*** AIR REDUCTION PRODUCT

AIRCO®

OFFICES AND DEALERS IN MOST PRINCIPAL CITIES

## AIR REDUCTION

**60 East 42nd Street • New York 17, N. Y.**

Air Reduction Sales Co. • Air Reduction Pacific Co.

Represented Internationally by Airco Company International

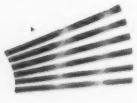
*Divisions of Air Reduction Company, Incorporated*

NO MATTER WHERE YOU ARE

A GB DISTRIBUTOR is ready to give you practical, "down-to-earth" help on your silver brazing jobs.

GB's Distributor Sales Organization is made up of experienced salesmen who have a broad background of practical operating experience, as well as technical training, in silver brazing applications. One of those men is in your area—and he wants to work with you to find how GB Silver Brazing Alloys and GB Fluxes will speed up your operations, give you maximum results and save you money.

Each GB standard Silver Brazing Alloy is developed for specific cost and production requirements. They are all available in these easy-to-use forms . . . wire in coils or straight lengths, strips, sheets, simple or intricate formed pieces.



Call in your GB distributor for all the facts about the GB line—he'll gladly supply you with working samples of GB alloys and fluxes, as well as give you helpful assistance on any brazing problems you may have. (If you don't know his location, simply write us and we'll send his address.)

GB FLUXES . . . available in three main types to cover the low temperature silver brazing range:
GB No. 99—working range up to 1350° F
GB No. 88—working range up to 1650° F
GB No. 27—working range up to 2000° F

GB FLUXES . . .
Dissolve metallic oxides readily
Provide uniform flow of silver brazing alloy
Insure high joint strength

GB FLUXES

The physical properties and appearance of a brazed joint are controlled to a large degree by the flux which is used. For this reason it will pay you to team-up GB Flux with GB Silver Solder—they were developed to produce maximum results when used together.

GOLDSMITH BROS.
SMELTING & REFINING CO.
1300 W. 59th, CHICAGO, ILL.
Suppliers of Precious Metals to Industry Since 1867


lications because I realize that there are many, many points in the "welding art" that need clarification before we can truly call it the "welding science". This article, however, is a good example of the dangers that the industry faces in drawing immediate conclusions based on very meager evidence. Somewhat like being accused by your wife of ". . . covering the floor with cigarette ashes" after accidentally dropping a speck of ashes.

It certainly cannot be denied that in spite of the authors' admission of limited number of samples and recommendations for more extensive tests, conclusions were drawn—especially by choosing the title that was used.

The tests conducted by the gentlemen were interesting to be sure, but unless more pertinent details are available, it is impossible to even say that the tests were valid.

A great deal of doubt about the results crops up immediately when it is noted that the higher frequency used was 2 megacycles. The reason for such a choice of frequency would be very interesting. Certainly no one can subscribe to the thought expressed in the subtitle that: ". . . a very high frequency alternating current should produce an even greater improvement. . . ." This is fully the same reasoning that says if a cup of water is good for a thirsty man in the desert, then to drown him would be even better for him!

Why wasn't a frequency of 120 or 360 or 400 cycles per second used? All are readily available. At 2 megacycles skin effects become very pronounced — inductive and capacitive effects must be examined. Certainly if the advantage of a-c is due to mechanical pool agitation, then using a current of 2,000,000 cycles per second would rule out any such action—after all, the material to be agitated (molten pool and slag) has mass and inertia.

If the agitation of a pool of metal in a-c welding is due to the cyclic variation in power in the air (120 power impulses per second for 60-cycle current) then the release of 4,000,000 power pulses per second into the weld zone would certainly be difficult to distinguish from direct current from the standpoint of heat generation.

In fact, I would be willing to suggest that if *all conditions* for arc stability on *all* tests had been identical (eliminating skin effects, identical length of arc, no difference in electrodes, etc.), the final physical characteristics of the welds produced by the 2 mc arc might have come pretty

# 2 more examples of THERMIT WELDING ECONOMIES

**SOW BLOCK**

Replacement of this damaged sow block for a 35,000-lb. forging hammer would have been costly and time consuming — Thermit repaired it quickly and economically.

**48" MILL PINION**

Weeks of costly idle time were saved by Thermit Welding the 28" neck instead of waiting for a replacement.

**Thermit Welding is the answer to repair problems in many different plants—for a wide variety of equipment. Reasons:**

- consistently sound welds
- minimum of technical skill required
- speedy repairs
- lower than replacement costs

**INVESTIGATE THERMIT® WELDING**

*always ready to go to work*

DETINNING •
THERMIT WELDING •
METALS & ALLOYS •
ARC WELDING—*Materials and Equipment* •
CHEMICALS & ANODES *for Electrotinning* •
CERAMIC OPACIFIERS •
STABILIZERS *for Plastics* •
TIN, ANTIMONY & ZIRCONIUM CHEMICALS •

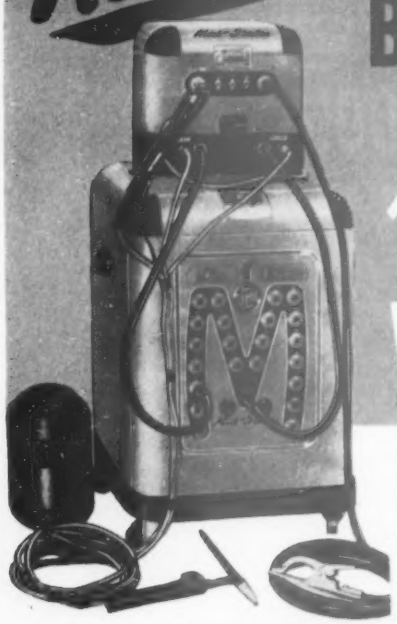
## METAL & THERMIT CORPORATION

100 EAST 42ND STREET • NEW YORK 17, N. Y.

Newark, N. J. • Pittsburgh, Pa. • E. Chicago, Ind.

So. San Francisco, Cal. • Philadelphia, Pa • Toronto, Canada

# ANYONE CAN DO A BETTER JOB WITH Mid-States HEAVY-DUTY WELDERS



*Mid-States Model 310, 7-300 amps. with Model 13-D "Missing Link"*

Even operators with a minimum of experience can do a real workmanlike job with Mid-States Simplified Welding. Mid-States welders provide automatic arc starting, instant amperage changes, and 100% penetration. Virtually adjust themselves to the job! Instant starting speeds up production and eliminates burn-through when welding light metals. 100% penetration assures a stronger, smoother weld that requires only a minimum of cleaning and grinding.

There are no moving parts to wear out, adjust, and maintain—a Mid-States Welder will continue to provide top performance year after year with only a minimum of attention. In addition, the Mid-States Welder can be used for brazing, soldering, hard-surfacing and heating.

## NOW! YOUR PRESENT WELDER CAN DO INERT GAS SHIELDED WELDING . . .

**JUST ADD THE MID-STATES "MISSING LINK" AUTOMATIC ARC STABILIZER . . .**

Add the Model 13-D "Missing Link" and you've got the benefits of inert gas shielded arc welding at sensationally low cost. Model 13-D is easily attached to any A.C. or D.C. welder of 0-300 amps. Model 23 is for A.C. or D.C. welders of 0-600 amps. This compact unit includes a high frequency generating circuit and solenoid valves to control flow of inert gas and water. The entire unit is controlled through a fingertip switch mounted on the welding torch.

*Model 13-D "Missing Link"*

**WRITE TODAY** for complete information on Heavy Duty Mid-States Welder and the Model 13-D "Missing Link" for inert gas shielded welding.

Mid-States WELDER MFG. CO.
6023 SOUTH ASHLAND AVENUE • CHICAGO 36, ILLINOIS


close to the d-c results. (Electronic engineers tell me that sometimes they use high frequency to light the filaments of vacuum tubes in order to reduce magnetic and thermal hum effects associated with power line frequencies—if it is not convenient to use direct current.)

Furthermore, let's remember that in the interpretation of any experimental results, it is extremely important that differences of a few percent are significant only if:

(*a*) All of the variables entering into the experiment can be controlled within a few percent.

(*b*) A large number of tests are made and the results of the many tests agree within the same limits.

(*c*) Similar experiments by different people and different techniques show the same results.

The search for more fundamental knowledge is certainly something that should be encouraged in the welding industry; but let's have more comprehensive and realistic tests before we conclude that something has been "tested and found wanting."

Cordially yours,
Niels C. Miller
President
Miller Electric Mfg. Co.
Appleton, Wis.

• • •

### Request from Mexico

Dear Sir:

Our company publishes monthly a welding bulletin where we bring interesting articles on welding.

In your May edition, we read an article that was titled "Faster speed, fewer rejects," which was written by Gilbert L. Bethel. We would appreciate your allowing us to reproduce this article in our bulletin.

Very truly yours,
Otto Westendarp
General Manager
Super Tecnica, S. A.
Mexico

*You have our permission to do so.*

### It was news

Dear Sir:

I wish to express my appreciation and that of The Cleveland Engineering Society membership for the article . . . entitled "Cleveland to build engineering center," which appeared on page 79 of the March issue of WELDING ENGINEER.

Sincerely,
Ralph R. West
President
The Cleveland Engineering Society
Cleveland 15

# An Entirely New Concept of Low Hydrogen Welding

# ATOM•ARC

Combining the best in welding arc characteristics with the highest physical properties known to steel producers today . . . *ATOM ● ARC* electrodes meet the stern requirements of the Atomic Age.

## Compare Atom • Arc with Ordinary Low Hydrogen Electrodes

**Faster . . .** For the first time in the industry, *ATOM ● ARC* utilizes iron powder in the electrode coating of a low hydrogen electrode—making possible the use of higher welding currents with either A.C. or D.C.

**Greater Deposition Efficiency . . .** Amazing deposition efficiencies are made possible because iron powder contained in the electrode coating serves as an additional source of weld metal.

**No Moisture Pick Up . . .** *ATOM ● ARC* is packed in 50-lb. hermetically sealed metal containers. Electrodes will effectively resist detrimental moisture pick up for ten days after opening container.

**Weld Appearance . . .** The full covering, easy to remove slag helps to form a smooth, uniform weld bead—free of undercut.

**Ease of Welding . . .** *ATOM ● ARC* reduces welder fatigue because the heavy electrode coating permits contact with the work in all positions.

**Highest Physical Properties . . .** *ATOM ● ARC* is manufactured in six A.W.S. low hydrogen grades and will meet all specifications for these types of electrodes.

▶ *Call your Alloy Rods Company distributor or write direct to nearest plant for further information or demonstration.*

**ALLOY RODS COMPANY**

*NO FINER ELECTRODES MADE . . . ANYWHERE*

Alloy Rods Co.

**General Offices & Plant**
**YORK 2 • PENNSYLVANIA**

**Pacific Coast Division**
**EL SEGUNDO • CALIFORNIA**

I don't know anything about welding... but my best boy friend does and he uses...

CMD
CHIPPING
HAMMERS

He even told me why: "CMD" hammers are ruggedly built to stand up under hard use day in day out!"

P.S. So are good distributor ships are open too! Write us today

CMD
CHICAGO MANUFACTURING & DISTRIBUTING CO.

1912 West 46th St.,
Chicago 9, Illinois


## NEWS . . . . . *from page 6*

day conference in London sponsored by the International Council of Scientific Unions. Co-author of the paper was Selby E. Summers, who assisted Newberry in development of the microscope.

* * *

### Alloy Rod opens new plant this month

PRODUCTION of hardfacing rods was to begin this month in the new Whittier, Calif., plant of Alloy Rod & Metal Division of Victor Equipment Co. A 6,000-sq-ft unit housing a $100,000 furnace was to be completed this month. Another 15,000-sq-ft building will be erected later on the six-acre site.

* * *

### Welded steel ducts carry air in new building

ROUND ducts of welded sheet steel fabrication, some as large as 72 in. in diameter, will supply cool air for workers in one of New York City's most advanced-design office buildings —on 42nd st. in the Grand Central area. The magazine *Steel Facts* reports that the more than 100 miles of duct was to be made from steel because, even in thin sections, it has the rigidity to carry air at high pressure and velocity without "breathing" or distortion. Also, it can be readily welded at seams to prevent escape of air.

* * *

### "Employ Handicapped Week" runs from Oct. 3 through 9

TENTH annual celebration of National Employ the Physically Handicapped Week will be observed from Oct. 3 to 9. This is a week set aside annually by Congress since 1945 and given presidential endorsement.

* * *

### Weld trolley buses in Australia

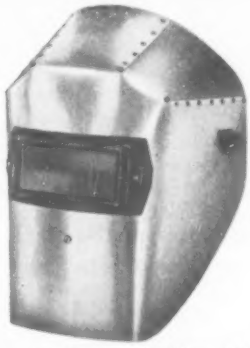
WELDED steel frames were recently used in construction of trolley buses in Hobart, Tasmania, Australia, said to be the first time such fabrication was used in that state. It was performed by City Bodyworks Pty. Ltd. Some 740 sections were assembled by arc welding.

The steel-box sections for the frames were formed and welded in Sydney, then shipped to Hobart. There they were set out on jigs and arc welded, with the side and roof frames being joined while lying on their sides. After erection on the chassis, they were welded into position.

*—McGraw-Hill World News*


sellstrom
safeguards
designed
for
comfort

SENSATIONAL NEW ALUMINUM WELDING HELMET



No. 206 Aluminum Welding Helmet
Keeps Welder "Cool as a Cucumber"

The fibre helmet will now have to make room for a newcomer—the Aluminum Helmet—which can well take first place in helmet preference among welders everywhere.

1. Sheet aluminum, laminated to a formed fibre base, becomes a positive heat reflector. It throws back the heat, keeps the welder's face "cool as a cucumber."

2. Consider these comparison tests made by a recognized testing laboratory. The heat source was two inches from the helmet.
   a) At 295 degrees Fahrenheit outside the helmet the uncoated fibre helmet registered 201 degrees inside the helmet but the aluminum helmet registered only 107 degrees inside.
   b) At 400 degrees Fahrenheit outside the helmet the uncoated fibre helmet burst, shattered, fell apart, but the aluminum helmet, after ten minutes of this intense heat, registered only 141 degrees inside.

3. This helmet costs no more than a good fibre helmet. Your choice of Standard or Sel-O-Matic headgear and either the front loading or "Lift Front" plate holder. Headgears and plate holders are interchangeable.

*This aluminum helmet will soon be available at all Sellstrom dealers. In the meantime, see it at our booth 31 at the Chicago National Safety Show or write us for the complete details.*

sellstrom
MANUFACTURING COMPANY

*Eye and Face Safeguards*
*Designed for Utmost Comfort*

226 Hicks Road — Palatine, Ill.

### Pennsylvania Optical Co. exhibits in Harrisburg show

A COMPLETE display of industrial safety equipment, including welding lenses and goggles, was the feature of an exhibit by Pennsylvania Optical Co., Reading, Pa., at the first annual Pennsylvania Industrial and Construction Exposition held last month in Harrisburg.

* * *

### CGA publishes pamphlet on unserviceable cylinders

"RECOMMENDATIONS for the Disposition of Unserviceable Compressed Gas Cylinders" is the title of Pamphlet C-2, recently published by the Compressed Gas Association. Copies are available from the CGA office, 11 W. 42nd St., New York City, at prices ranging from 15 to 25 cents each, depending upon the quantity ordered.

* * *

### Australian steel tube firm to triple production

BRITISH Tube Mills (Australia) Pty., of Adelaide, has decided to triple the production capacity of its precision steel tube plant. It will invest further capital in development of its facilities to produce electrically welded precisions steel tubes. An associated company, Australian Bundy Tubing Pty., has built a factory at Kilburn, South Australia, and is now engaged in initial trial production of "Bundyweld" steel tubing.

—*McGraw-Hill World News*

* * *

### Stud welding

—*Nelson Stud Welding photo*

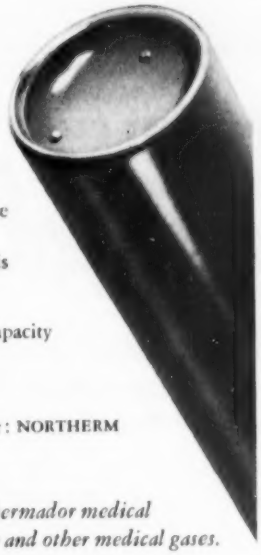
**CORRUGATED sheets over which concrete was poured for floors of new grandstand addition to Denver's Mile High Kennel Club were fastened to supporting bar joists by plug welding. Operator holds two overlapping sheets firmly against joist to insure good fusion for blind weld. Rectangular stud was used.**

**saves you money**
Norris-Thermador deep-drawn cylinders are curled under to form a heavy-duty built-in rolling surface that is even, strong, and permanent. *You save* because there is no rolling ring to lose or dent. Cylinders stand together evenly in transit. Further economies: cylinders are up to 10% *lighter* and fill faster than other monolithic filler type cylinders. And with Norris-Thermador's vast plant in the deep-water Port of Los Angeles, *you save* on overland freight.

**NORRIS-THERMADOR**

# acetylene cylinders

***precision-made***
An exclusive and extremely accurate cold-draw process keeps shell weight to a constant thickness — with maximum thickness and strength in the cylinder shoulders. Excess weight is eliminated. *In addition, all welding is X-ray controlled.* Norris-Thermador cylinders meet or exceed ICC specification 8. (Cylinders are also made to Canadian Board of Transport Specifications. A disinterested inspection agency is available as required for these cylinders.)



Acetylene Cylinders from 10 to 300 cubic foot capacity

**early shipment**
*Write or wire* for specifications on all sizes. Cable: NORTHERM

*Ask about precision-made Norris-Thermador medical cylinders for oxygen, nitrous oxide and other medical gases.*

**NORRIS-THERMADOR CORPORATION**
5215 South Boyle Avenue, Los Angeles 58, California

Please send me illustrated cylinder specification sheets.

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City_____ Zone____ State_____

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premium protection
priced right!

EYEGARD
IMPERIAL
GOGGLES

#502 CHIPPERS AND GRINDERS COVER GOGGLES, clear plastic, with perforated side shields

#500 WELDERS COVER GOGGLES with baffled side shields

★ Here are the goggles that all industry is acclaiming as providing the greatest combination of comfort and protection ever produced. "Imperials" are the finest yet are priced to save you money. Six styles — cover-all and regular. Write now for literature and prices.

★ Uses standard 50 MM round lenses
★ 22% larger than ordinary goggles
★ More ventilation through cup slots — no fogging of lenses
★ Feather-weight aluminum rims and side shields
★ Face shaped contour to fit snugly, comfortably
★ Available with or without metal adjusting top bar

AMERICAN INDUSTRIAL SAFETY EQUIPMENT COMPANY
3503 LAKESIDE AVENUE CLEVELAND 14, OHIO
*Division of The Burdett Oxygen Company, Cleveland, Ohio*

FOR BEST RESULTS USE

Silvaloy

Silver Brazing Alloy preforms for Production Brazing. Rings, Stamped or Coined Washers and Wire Forms

All inquiries given immediate attention and shipments made on short notice. Technical service men are available to assist you in proper joint design. Silvaloy brazing alloys also available in wire, strip, and powder from stocks in six branch warehouses.

1200 FLUX

Use when silver brazing Brass, Bronze, Copper, Nickel-Silver, Steel, Stainless Steel, Monel, Nickel, Inconel and other Nickel alloys. Furnished in ½ lb., 1 lb., 5 lb., 30 lb., and 65 lb. containers.

STEEL SALES
3348 S. PULASKI ROAD • CHICAGO 23, ILLINOIS
PLANTS: DETROIT, ST. LOUIS, MILWAUKEE, MINNEAPOLIS, INDIANAPOLIS
OFFICES: KANSAS CITY, GRAND RAPIDS

### General Electric forms new division

FORMATION of the Chemical and Metallurgical Division has been announced by General Electric Co. The division includes the former Chemical Division and the Carboloy Department, and it will be made up of five operating departments: Carboloy, Plastics, Silicon Products, Chemical Materials and Laminated and Insulating Products.

Robert L. Gibson has beeen named general manager of the new group, with headquarters in Pittsfield, Mass. Kenneth R. Beardslee will retain his post as general manager of Carboloy. Under the new organization, the former Chemical Division's four operating departments will remain unaffected; their general managers will continue to report to Mr. Gibson.

* * *

### Norelco diffraction school shifted to Chicago

THE fall session of the X-ray diffraction school sponsored by North American Philips Co., Inc., Mount Vernon, N. Y., will be held Oct. 25-29 at the Knickerbocker Hotel in Chicago. For the past eight years it has been held in the New York area. The firm expects a number of visitors to the National Metals Show (scheduled for Nov. 1-5) to come early in order to attend the Norelco school.

* * *

### Copper brazing firm moves to new site

SALKOVER Metal Processing of Illinois, Inc., recently moved to 2550 Edgington Ave., Franklin Park, Ill., a suburb of Chicago. The firm does copper brazing for metal-product manufacturers throughout the country.

Salkover formerly occupied two buildings—at 4209 W. Lake St., Chicago, the other at 15th and North Ave. in Melrose Park, another Chicago suburb.

* * *

### Lead-tin coating for steel

ACCORDING to a recent report by *Engineering & Mining Journal*, a McGraw-Hill publication, an 85% lead-15% tin alloy material can be electrolytically precoated onto strip steel, and the steel can be soldered without use of acid fluxes. Spokesmen for Thomas Strip Division of Pittsburgh Steel Co. said the coating is practically free from porosity and has good corrosive resistance. Plated out from a fluoborate bath, the coating also acts as a lubricant and is said to reduce wear on dies and forming rolls.

### Larger quarters for California distributor

PICTURED above is the modern concrete block building at 175 S. Arrowhead Ave., San Bernardino, Calif., that houses the welding supply business of Ted Cox, who founded his firm in 1946. The office and sales space occupy 2,400 sq ft.

The acetylene and oxygen loading dock has a low side for smaller trucks. The entire facility is set on a lot 100 by 150 ft, which includes a parking area. The Cox firm maintains three truck routes and supplies customers within a 75-mile radius. The staff has increased from the original one to six.

* * *

### Titanium produced by remote-control process

CONCRETE walls separate control panels from furnaces that are used to produce titanium ingots by Mallory-Sharon Titanium Corp., Niles, O. This remote-control system that operates the double-melting process was devised by the company with the coöperation of safety experts from private industry, the Atomic Energy Commission, the U. S. Bureau of Mines and other organizations.

Although the lightweight metal is not itself a combustible or hazardous material, high temperatures involved in melting require unusual precautions.

* * *

### Foote Mineral adds iron powder to line

FOOTE Mineral Co., Philadelphia, recently arranged with Easton Metal Powder Co., Inc., to market the latter's iron powder "RZ40" to the welding industry on an exclusive basis. The specially prepared coating is for the new iron-powder electrodes.

* * *

### August "On the job" tool approaches patented item

WELDING ENGINEER has been notified that the tool for accurate pipe marking described on page 54 of the August issue approaches a patented item. The patented tool is the "Boyce Centering Head" manufactured by Contour Marker Corp., Compton, Calif.


# NEW, REVOLUTIONARY

## METALLIZING GUN

MOGUL Turbo-Jet

***The Result of over 30 Years of Experience***

The Mogul Turbo-Jet will spray and deposit an extremely dense coating using wires from 20 ga. to 1/16" dia. from the highest melting point molybdenum to the softest metals. No changing of worm gears or feed rolls.

New Mogul Turbo-Jet is magnetic-controlled, with a spray range from 2½ inches per minute to 20 feet per minute.

Dual feed rolls individually driven, eliminate slippage and give more positive feed.

Will operate on acetylene, propane or natural gas 15 lbs. P.S.I.—low gas and oxygen consumption.

General purpose gun to take care of all your spraying applications.

**SPRAYS ALL METALS FASTER, WITH GREATER EFFICIENCY**

The New Mogul Turbo-Jet is the most perfectly balanced gun ever developed and is the result of over 30 years of leadership in the metallizing field.

It is built for years of trouble-free, high performance service with a minimum of maintenance.

The New Mogul Turbo-Jet will spray all metals faster and with greater efficiency than any other spray unit ever built.

Prove Mogul Turbo-Jet's superiority right in your own shop. Free Trial test to metallizing users.

**Be sure to visit our Booth No. 1456 at the National Metal Exposition, International Amphitheater, Chicago, November 1 through November 5.**

***Write for further information today on the New Mogul Turbo-Jet. Ask about free trial test offer to Metallizing users.***

MOGUL

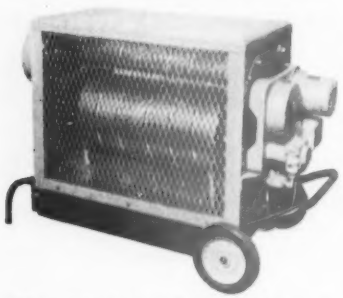
**METALLIZING COMPANY**
*of America*
**Dept. WE**
**3500 West Carroll Avenue, Chicago 24, Illinois**

**ON THE JOB**

***indoors or out***

Any place—indoors or out—
wherever clean, safe, dependable
heat is needed on the job
in a hurry . . . you can count on
Silent Glow Portable Heat.
Ideal for warming the men . . .
heating the work area . . .
temporary or emergency heat
at all times.

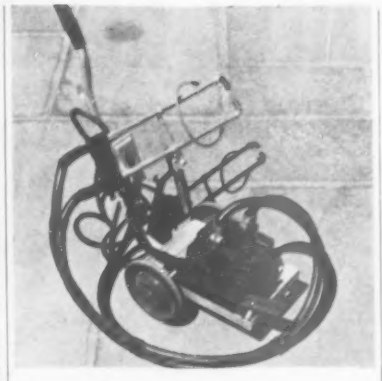
**INSTANT PORTABLE HEAT**
**WHEREVER . . . WHENEVER NEEDED**



**8** **MODELS**—*A Portable Heater to meet every heating need . . . radiant or forced air . . . from 168,000 to 420,000 BTU per hour. Write for details today.*

**SILENT GLOW**
*Portable*
**RADIANT HEAT**
BUILT TO DELIVER
BUILT TO TAKE IT

**THE SILENT GLOW OIL BURNER CORP.**
855 WINDSOR STREET, HARTFORD 1, CONNECTICUT

**Spot welder wins youth $100 in Ford contest**

THE spot welder pictured above took $100 first prize in the electrical division of Ford Motor Co.'s eighth annual Industrial Arts Awards competition in Detroit recently. It was built by 13-year-old Roy Chesley, of Los Angeles.

Young Chesley sent along a schematic diagram with his welder as well as "Instructions for Operating the Spot Welder." In addition to the cash prize, judges awarded the youngster an "Outstanding Achievement Award"—a three-day, all-expense trip to Dearborn, Mich., for him and his instructor, Fred Osburn, of Washington Irving Junior High School, Los Angeles.

While lacking a little in spelling, the youth's instructions were entirely clear:

"To operate this welder, you must first use fairly thin sheet metal. Put the two pieces of sheet metal that you have chosen to weld together between the two points of the gun. Pull the lower handle up so that there is no pressure on the metal. Push down the foot pedal until the spot at the end of the gun is red hot. Let your foot off the foot pedal, and then do the same thing over when you weld another spot."

His description of the welder's function: "When the two points come together, they make a connection and cause the metal in between the points to melt in that spot, which makes them hold together."

* * *

**G-E announces new film on productive maintenance**

"PRODUCTIVE Maintenance" is the title of a new full-color motion picture produced by General Electric Co., Schenectady. Running time is 25 minutes. The film purports to show industry how to get the most productivity out of existing facilities and dramatizes the concept and five-step plan of productive maintenance.


*for high conductivity forgings and castings for resistance welding....*

*Specify* **WW**

**Seam Welding Wheels**
**Bushings • Knees**
**Shafts • Spindles**
***and other***
***current-carrying parts***

Long, specialized experience with welding requirements establishes WW as a leading reliable source of high conductivity, high strength forgings and castings—in rough or finished form. Add to this experience WW's participation in Fansteel's continuous metallurgical research. Count on WW for the right alloy every time. WE MAKE THEM OURSELVES, WE KNOW THEY'RE RIGHT.

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**Without Obligation**
*. . . this informative technical catalog. Write today.*

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W544C
Division of Fansteel Metallurgical Corporation
11644 Cloverdale Ave. • Detroit 4, Michigan

### Issue specifications for aluminum filler wire

FOR the first time, filler metal for inert-gas, metal-arc welding aluminum has been standardized by new specifications issued jointly by the American Welding Society and the American Society for Testing Materials (AWS designation A5.10; ASTM designation B285). These include aluminum and aluminum-alloy welding rods and bare electrodes. The rods are for use with the gas, carbon-arc, atomic-hydrogen and Tig (tungsten inert-gas) welding processes. Bare electrodes are used with the Mig (metal inert-gas) process.

Twenty-two classifications of filler metal are established by these specifications, including all the commonly used aluminum and aluminum-alloy filler metals.

Copies of the specifications can be obtained at 25 cents each from AWS headquarters, 33 W. 39th St., New York City 18, or ASTM, 1916 Race St., Philadelphia 3.

* * *

### 36-in. pipe being made by U. S. Steel

OFFERING a significant increase in capacity from 30-in. pipe, a new 36-in. diameter pipe is now being produced by U. S. Steel Corp.'s Consolidated Western Steel Division at its Orange, Tex., plant. The firm's officials have pointed out that the new pipe will permit long-distance overland transmission of natural gas and oil in unprecedented volume.

* * *

* * *

### Cylinder firm moves to Chicago suburb

FORMERLY located in Chicago, Hannifin Corp., manufacturer of pneumatic and hydraulic cylinders, has moved to Des Plaines, Ill., a Chicago suburb. The general offices and main plant occupy a building of 110,000 sq ft. Located across the street is another plant (25,000 sq ft) for manufacture of air-control valves, filters, regulators and lubricators.

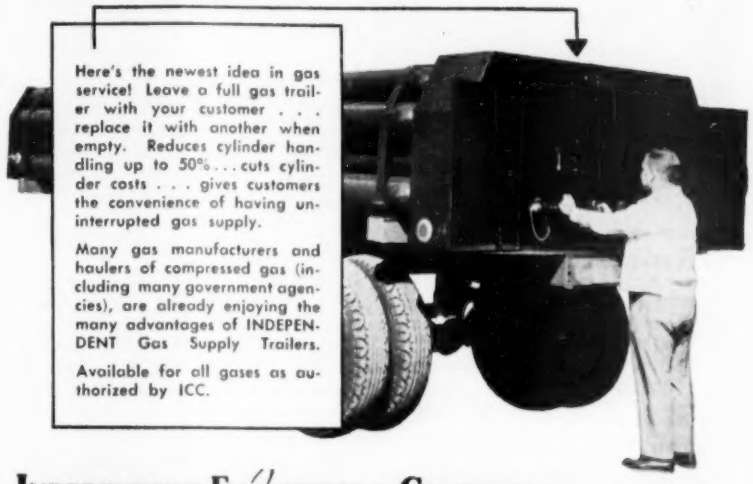
* * *

### Distributor appointments

*The Liquid Carbonic Corp.*, Chicago: The Atlas Co., Cincinnati; B & B Air Products, Inc., Doylestown Township, Pa.; Blackhawk Welding Supply Co., South Beloit, Ill. Chrismer-Hull Co., Columbus, O.; High Welding Co., Lancaster, Pa.; Irish Welding Supply Co., Buffalo; Lamb Welding Supply Co., Cedar Rapids, Ia.; Triangle Engineering Co., Upland, Pa.


REDUCE CYLINDER HANDLING

Up to 50% with INDEPENDENT Gas Supply Trailers!



Here's the newest idea in gas service! Leave a full gas trailer with your customer . . . replace it with another when empty. Reduces cylinder handling up to 50% . . . cuts cylinder costs . . . gives customers the convenience of having uninterrupted gas supply.

Many gas manufacturers and haulers of compressed gas (including many government agencies), are already enjoying the many advantages of INDEPENDENT Gas Supply Trailers.

Available for all gases as authorized by ICC.

INDEPENDENT ENGINEERING COMPANY, Inc.

CONSULTING · RESEARCH · DESIGNING

Manufacturers of CYLINDERS AND GAS PRODUCING EQUIPMENT ACETYLENE · OXYGEN · HYDROGEN · NITROGEN

O'FALLON 5, ILLINOIS

We Invite Your Inquiries

NEW 150' WELDREEL Welding Hose Reel

Now you can store and handle 150 feet of double welding hose on a Weldreel — with the new Model OAB. The new big reel gives you all the safety and convenience of the 50-foot Model OA and, like the smaller model, is ruggedly built to stand up for years under heavy industrial use.

ELIMINATES HAZARDS TO SAFETY — prevents tangles of hose on the floor, cause of many industrial accidents. Permits welder to reel out only as much hose as he needs.

MAKES HOSE LAST LONGER — Reduces chances of hose being run over, cut in two or set on fire by a hot electrode. Users of the Weldreel report three to five times greater hose life.

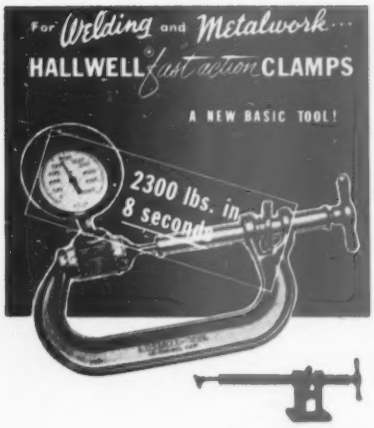
EASY TO INSTALL ANYWHERE — Simple mounting permits installation in any position, on floors, walls, ceilings or on mobile equipment. Requires only 11" x 24" space.

CONVENIENT TO USE — Keeps hose in a handy location where it may be used alternately by two or more welders. Hose pays out freely and locks automatically at desired length. A slight tug releases lock, allowing the powerful spring to rewind hose onto reel.

*See the Weldreel at your supply house or write us direct for descriptive literature*

WELDREEL

UNITED SPECIALTY CORPORATION
P. O. BOX 698
EL DORADO, ARKANSAS




Tooling & Fixture

**SAVE TIME • SAVE MONEY**

Just 2 easy, fast actions give you wedge-lock holding pressures, depending on size, from 500 to 4000 lbs. in seconds!

1. Thrust handle forward
2. Turn handle to desired pressure. **No other tools** needed.

Hallwell Clamps are guaranteed to pay for themselves.

***Better • Faster • Lower Cost***

**Write Dept. W.E. for the supplier or representative nearest you.**

HALLWELL TOOL COMPANY
406 SOUTH HILL STREET, LOS ANGELES 14, CALIF.

## Industrial health

INDUSTRIAL HYGIENE FOUNDATION, 18TH ANNUAL MEETING CONFERENCES. Published by Industrial Hygiene Foundation of America, Pittsburgh 13, Pa., 1954. Paper, 6 by 9 in., 187 pages. Price $3.

Transaction of the 18th Annual Meeting of the Industrial Hygiene Foundation of America held in Pittsburgh last year are presented in this volume. It contains 18 papers and discussions which were presented at the medical, legal, joint medical-legal, engineer and chemical-toxicological conferences.

Papers of the engineering conference will hold the greatest interest for WELDING ENGINEER readers, especially those papers discussing, "Mechanical Arrangements for Controlling Dust and Fumes" and "Principles of New Plant Design for Health Protection."


**BUY**

**SELL**

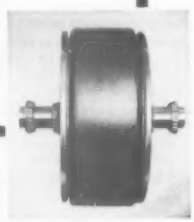
**USE**

**SHAWINIGAN CARBIDE**

**SHAWINIGAN PRODUCTS CORPORATION**
**EMPIRE STATE BUILDING**
**NEW YORK 1, N. Y.**

Buy **Aronson**
**TURNING ROLLS**
**for Automatic Welding or for Manual Welding**

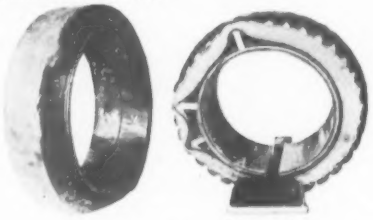
Micrometer controlled speed, ZERO to Maximum Inches Per Minute . . . Precision Cut Gears with Absolute Minimum Backlash . . . Built-In MAGNETIC BRAKING for smooth, precise stops . . . Low Voltage Control Circuit . . . Magnetic Reversing Starter and Safety Disconnect switch . . . Anti-Friction Bearings Throughout . . . Precision Steel Ways and exact diameter settings . . . Gear-boxes Packed for Life . . . All Rolls stressed for 100% Overload Protection.



Overloading or accidentally dropping the load on an Aronson Turning Roll WILL NOT crush and ruin the tire. The Overload Disc of steel placed on each side of each tire is smaller than the tire by just that amount which allows a safe deformation (flattening) of the tire which occurs at maximum load. Compression and tension Tie-Rods hold the Overload Discs firmly against the steel rim of the rubber tire, forming an effective axle as large in diameter as the O.D. of the steel tire rim. Crushing the tire is impossible regardless of the load put on an Aronson Turning Roll. Large Timken Bearings maintain perfect alignment.

Any Tank or Cylinder will be somewhat out-of-round and will not be straight, but will have a belly or bend in its average centerline axis. In the case of non-rigid cylinders, multiple rolls are used to hold a true centerline, ironing out the belly or bend. When working rigid tanks and cylinders, it is best to have one roll at each end so as to avoid the belly placing all the load on the middle roll when that belly is down, and all the load on the two end rolls when the belly is up. It is to allow for the average amount of out-of-round and belly in cylindrical workpieces that ARONSON has stressed all units for 100% overload Protection. Momentary overloads as high as 100% will not breakdown an Aronson Roll.

**AVOID DAMAGE LIKE THIS**



**UNDERCUTTING CAUSED BY OVERLOADS**
Continuous overloads on this tire caused the rubber to bulge out over the steel bond. This, in turn, set up a shearing or cutting action in the tread. Tire is ripped around the bond on both sides and is about ready to fall off.

***Send for Specification Brochure***

Courtesy of the Rubber Manufacturers Assoc., Inc.

**Visit our Booth 2354 at the National Metal Exposition in Chicago — November 1-5**

**Aronson MACHINE CO.** WORK WORK **ARCADE, N. Y.**

GEORGE TERBEEK has been appointed field representative in Cleveland for Jackson Products, Warren, Mich. He will cover Ohio and Pennsylvania.

* * *

VERN R. HALTER has been named general superintendent of all The Liquid Carbonic Corp.'s gas plants. He will be responsible for the operation of the company's carbon - dioxide, industrial and medical gas plants, with headquarters in the Chicago general office. Mr. Halter has been with the firm since 1930 and previously served as Southern District gas-plant superintendent.

* * *

ALFRED G. HOPPE, mechanical engineer with Chicago, Milwaukee, St. Paul and Pacific Railroad Co., Milwaukee, has been elevated to the grade of Fellow of the American Society of Mechanical Engineers. While in charge of the railroad's mechanical design department, he was responsible for the pioneering development of all-welded passenger and freight cars. Mr. Hoppe is the author of a number of papers concerning such subjects as the performance of Diesel-electric locomotives and the adoption of fusion welding process for locomotive boilers.

* * *

J. GIBSON BROWN has been appointed assistant vice-president, engineering, of U. S. Steel Supply Division, U. S. Steel Corp., Chicago. He joined the sales department of the supply division in Chicago in 1937. He successively became manager of trade promotion, assistant to the manager of operations and assistant to the vice-president of operations.

* * *

W. BECKHARDT has been named technical service representative in the Norristown, Pa., area for Oakite Products, Inc., New York City, manufacturer of industrial-cleaning and metal-treating materials.

*Specify* COYNE *Quick Charging*

**ACETYLENE CYLINDERS**

**– for maximum safety – durability – acetylene capacity**

Coyne manufactures both seamless and welded acetylene cylinders—all made to the high standards of ICC specifications. The method of manufacture has been approved by the Bureau of Explosives. The complete line ranges from 10 to 320 cubic feet capacity.

This source for top quality, with its two strategic locations, assures prompt deliveries across the country—with worthwhile freight savings. The Coyne line is particularly noted for careful workmanship—the fine materials used—and its well designed parts.

Write to either the California or Tennessee address for catalog and pricing information.

We have opened a new acetylene cylinder manufacturing plant and sales office at

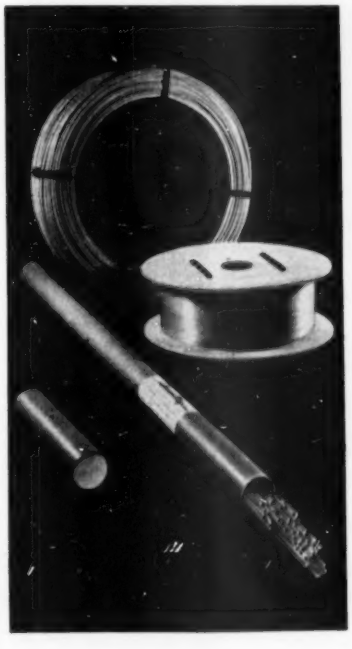
**155 W. Bodley Ave.**
**P.O. Box 3217**
**Memphis 9,**
**Tennessee**

This new location has added value for Coyne customers because of *freight savings*. Compressed gas cylinders are available from both locations.

COYNE

**COYNE CYLINDER CO.**

200 PAUL AVE. SAN FRANCISCO 24, CALIF.



**FOR QUALITY WELDMENTS**
**use**
Drawalloy CORPORATION
**QUALITY CONTROLLED STAINLESS STEEL WELDING WIRE**

- **available in Spools, Coils and Lengths**
- **for Automatic and Semi-Automatic gas and inert arc welding**

Welding wire by Drawalloy is made to an exacting high standard . . . a high standard established by long-experienced welding men who know welding wire and how it must work. Set-ups for automatic and semi-automatic welding take more time than regular welding. That's why you want to be sure of satisfaction *before* you start. This *reliable* wire is weld-tested to give the best results every time. Write today for complete information and prices.

**WELDING SUPPLY DISTRIBUTORS:** Get prompt delivery on all sizes and grades of stainless and tool steel wire for gas and inert arc welding.

Drawalloy CORPORATION

LINCOLN HIGHWAY AT ALLOY STREET • YORK 12, PENNSYLVANIA

One of the most satisfactory pieces of equipment for speeding up maintenance work at Sohio Petroleum Company's Latonia Refinery has been the Arcair torch. This torch has saved Sohio up to 80% in time and money where a repair job involves the gouging, cutting or removal of metal.

The maintenance department of the Latonia Refinery has been using the Arcair torch for three years . . . the seven torches in operation throughout the plant find daily use in gouging out defective welds, removing steel plates for

A worker at Sohio uses the Arcair torch to gouge out welds in the mild steel bottom plates of a 55,000-barrel floating roof tank.

vessel repair, cutting steel and alloy castings, gouging ring joint pipe flanges for alloy deposit welding and for miscellaneous cutting of metals.

At Sohio the Arcair torch has replaced the use of pneumatic chipping tools and arc rods for the majority of cutting, gouging or metal removal jobs. Before, it was a matter of chipping, which was slow, or burning, which produced undesirable slag. The maintenance department found the Arcair torch was fast and removed slag without the necessity of going over the work a second time . . . a jet of compressed air blows away the slag, leaving a clean, even surface. In most cases, further chipping or grinding is not necessary.

If gouging and cutting metals is a regular part of your plant maintenance operations ask your welding supply dealer how you can realize similar savings in time and money with the Arcair torch. He will be glad to arrange an actual demonstration in your plant. Write for free bulletin and the name of the nearest Arcair dealer in your area.

ARCAIR COMPANY
EASTERN DIVISION
P. O. BOX 337
Lancaster, Ohio
WESTERN DIVISION
P. O. BOX 4227
Bremerton, Wash.

Arcair TORCH
Cuts all metals—using only electric arc and compressed air


FRANK L. PERRIN has been appointed Chicago district manager for General Electric Co.'s X-Ray Dept., Milwaukee. He succeeds R. A. MILLS, who retired after 48 years of service, nearly 20 of them as manager of the Chicago office. JOHN W. DAVIDSON was named to succeed Mr. Perrin as manager of the Baltimore district office.

* * *

JOSEPH F. WHITAKER has been appointed vice-president in charge of sales for Weller Electric Corp., Easton, Pa. He will plan and supervise the national promotion and sales of its soldering guns, soldering kits and power sanders. Mr. Whitaker joined the firm last year as sales manager. Before that he had been with International Resistance Co., Philadelphia.

* * *

ABBOTT L. PENNIMAN, JR., a member of the public utility advisory committee of the Welding Research Council, American Welding Society, has been elected to honorary membership in the American Society of Mechanical Engineers. Awarded for "acknowledged eminence in the engineering field," the rank is the highest honor conferred by ASME. Mr. Penniman is vice-president of Consolidated Gas, Electric Light and Power Co., Baltimore.

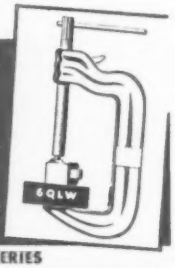
* * *

DONN BORING has been appointed eastern district manager for Tweco Products Co., Wichita, Kans. He will be responsible for sales in 14 eastern states. With Tweco since 1952, Mr. Boring had been in the sales and advertising department in Wichita. Before that, he had been active in the Canadian welding industry for more than 15 years.

* * *

J. P. COUGHLIN has joined Eutectic Welding Alloys Corp., Flushing, N. Y., as assistant to PRESIDENT RENE D. WASSERMAN. His chief function will be strengthening Eutectic's distributor organization. Mr. Coughlin, who will begin his new duties early this month, was formerly manager of the arc-welding division of Westinghouse Electric Corp. in Buffalo. He had been with that firm 15 years. He is a member of the American Welding Society and National Welding Supply Association


GRAND
WELDERS' GROUND CLAMPS
- EXTRA STRONG
- FAST ACTION
- POSITIVE CONTACT
- HOLDS ANY SURFACE
- SPATTER PROOFED




QLW SERIES
Grand quick setting Ground Clamps of NACO No. 6 Super Steel are first choice with welders. Available in 3 popular sizes.
2-QLW 200 Amps 1¾" Max. Opening
4-QLW 400 Amps 3⅜" Max. Opening
6-QLW 600 Amps 5⅛" Max. Opening

Famous GRAND "C" Clamps
Alloy Steel (Stronger than forged) Spatter-Proofed Screws, Deep Throat—Replaceable Swivels

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2" TO 12"

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GRAND SPECIALTIES CO.
Manufacturers Since 1921
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When You Weld Cast Iron
Select the Correct
Fuse-Well
CAST IRON WELDING RODS OR ELECTRODES

FUSE-WELL NO. 11
FUSE-WELL No. 11, *Square*—Gray Cast Iron Welding Rod for Acetylene use in filling or building up new or worn castings producing machineable welds.

FUSE-WELL NO. 12
FUSE-WELL No. 12, *Round*—Has the same uses and analytical ingredients as Fuse-Well No. 11.

FUSE-WELL NO. 14 MOLY
FUSE-WELL No. 14, *Moly*—An Iron Base Rod with alloys added for finer grain structure and greater strength.

FUSE-WELL NO. 22
FUSE-WELL No. 22, *Electrode* — Light coated Rod to be used for AC or DC welding in the fabricating and repairing of cast iron castings.

Sold through Leading Distributors

THE CHICAGO HARDWARE FOUNDRY CO.
Weld Rod Division
NORTH CHICAGO, ILLINOIS

I. WENDELL HAMM has been appointed director of manufacturing for The Carborundum Co., Niagara Falls, N. Y. He formerly was chief of industrial engineering for the DuPont Co.'s Nylon Division.

* * *

F. B. DOANE, president of Magnaflux Corp., Chicago and one of its founders, was recently elected chairman of the board of directors, and CARL E. BETZ was named vice - chairman. Named to succeed Mr. Betz as executive vice-president was W. E. THOMAS, who had been vice-president of sales. WYLIE D. REID, JR., was named treasurer and continues in his duties as second vice-president and plant manager.

Doane

* * *

JOHN A. NEYENHOUSE, JR., has been appointed assistant district manager of United States Steel Supply Division, U. S. Steel Corp., at Newark, N. J. He joined the division as a salesman in the Newark warehouse in 1951 and became assistant to the district manager last year.

* * *

HAROLD MCGRATH has been appointed sales engineer for the automotive division of Marquette Mfg. Co., Minneapolis. He will work with the firm's distributors in Wisconsin, upper Michigan, northwestern Illinois and Iowa in the sale of electric welders, welding rods, oxyacetylene equipment and battery chargers.

* * *

CARL G. FLYGARE, grinding development engineer at Norton Co., Worcester, Mass., recently retired after 47 years with the firm. HERBERT A. SILVEN, a Norton machine designer since 1916, succeeds him as head of the engineering department.

* * *

JOHN LAWRENCE has been elected executive vice-president of Joy Mfg. Co., Pittsburgh, manufacturer of machinery for basic industries.

* * *

ROBERT J. ELY has been appointed assistant chief metallurgist for American Brake Shoe Co. He joined the company in 1945 and had been process metallurgist prior to his promotion. He is located at firm's research center in Mahwah, N. J.


**3-DAY SPECIALIZED WELDING CLINIC**
**IN BOSTON, October 13, 14, 15**

**DEMONSTRATIONS**
**ON THESE MATERIALS**
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**BY THESE WELDING METHODS AND PROCESSES**
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281 ALBANY STREET, CAMBRIDGE 39, MASS.
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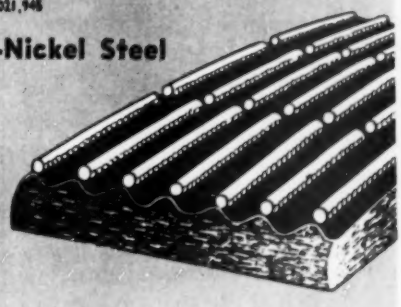
USE
**MANGANAL**
U.S. PATS. 1,876,730—1,947,167—2,021,945
11% - 13½% Manganese-Nickel Steel
**ROUND APPLICATOR BARS**
to Rebuild & Repair
**CRUSHER JAWS**



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**A-S Soldering & Tinning Alloys**

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**A-S DISTRIBUTORS EVERYWHERE**

**ALL-STATE**

**WELDING ALLOYS CO. INC.**

**White Plains, N.Y.**


BRUCE A. YATES has been named assistant product manager in charge of welded tubing sales of Kaiser Aluminum & Chemical Sales, Inc., with headquarters in Chicago. He will have supervision of the welded pipe sales program. Prior to his new assignment, he was a specialist in welded pipe and a salesman in the Cincinnati district.

* * *

JOHN M. DOLAN has been named to the newly created post of vice-president, sales, of Solar Aircraft Co., San Diego. He will be in charge of both military and commercial sales of products of the San Diego and Des Moines, Ia., plants of the firm. Mr. Dolan had been vice-president, general sales manager and director of The Hydraulic Press Mfg. Co., Mount Gilead, O.

* * *

GEORGE B. SECOR was recently elected to the board of directors of Gregory Industries, Inc. A director of The Toledo (O.) Trust Co. since 1934, Mr. Secor became associated last fall with Gregory's Nelson Stud Welding Division as a special sales consultant. Eleven other directors, including four officers of the company, were re-elected to the board.

* * *

ARTHUR TAUSCHER has been named plant engineer in charge of maintenance and construction of The Cooper Alloy Foundry Co., Hillside, N. J.

* * *

C. M. RHOTEN has been named factory manager of Herbrand Division of The Bingham-Herbrand Corp., Fremont, O.

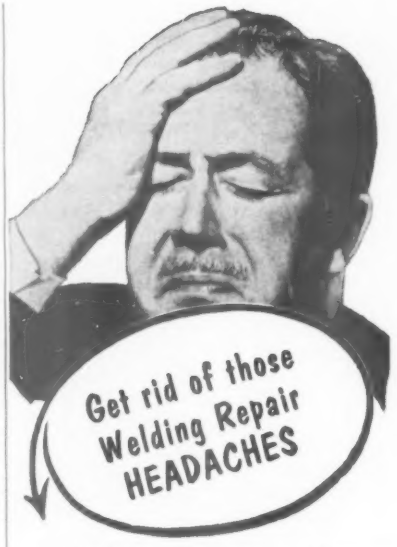
* * *

## Died . . .

LEON A. PADDOCK, president and a director of American Bridge Co., U. S. Steel Corp., from 1931 until his retirement in 1946, died July 27 after a long illness. He was 75. Mr. Paddock directed the structural-steel fabricating and erecting work for many of the world's longest bridges and tallest skyscrapers, including the San Francisco-Oakland Bay Bridge, Empire State and Chrysler Buildings and Radio City.

* * *

FRANK F. MOONEY, who had been in the welding industry for more than 40 years, died in Philadelphia recently. He was 72. He retired from Linde Air Products Co. seven years ago. Mr. Mooney had been a service operator and demonstrator for that firm in Philadelphia, Pittsburgh and Atlanta.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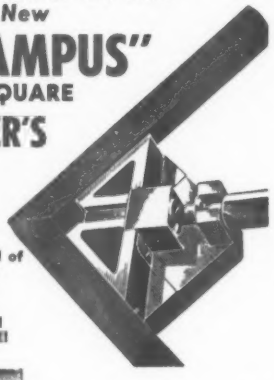
**RIGHT-ANGLE WELDS**

***In a Fraction of the Time With the New***

**"GRAMPUS"**

**ALL SQUARE**

**WELDER'S VISE**



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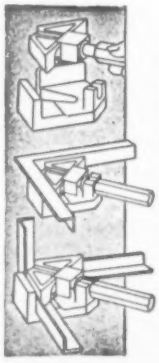


Cuts down valuable time otherwise spent in setting mitred angle and other profiles, rounds and tubes for welding accurately at right angles. Work inserted is immediately ready for applying the seam and when released is free from distortion.

SPECIFICATIONS.

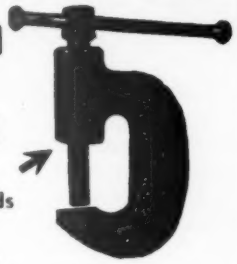
Model A. Profiles up to 2-in. or 1-in. diameter. Wt. 6 lbs.

Model 2A. Profiles up to 4-in. or 2-in diameter. Wt. 12 lbs.

**BELMONT ABRASIVES**

**285 Newbury Street BOSTON 15, MASS.**

"Red Head"
WELDING CLAMPS
• Designed for Welding •
No Threads To Damage



1. Case hardened threads are always protected from weld spatter and never exposed to damage in open or closed position.

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Weld with Wagner

# 30 YEARS AGO

*(Taken from* THE WELDING ENGINEER *of October, 1924)*

AN article in this issue entitled "Cutting Steel Underwater," by T. F. Hagglund, International Submarine Co., Inc., New York City, describes various underwater cutting jobs performed with the oxyelectric torch.

—30 YEARS AGO—

LOUIS BURTON MACKENZIE, editor of THE WELDING ENGINEER, died Oct. 6 at the age of 44.

—30 YEARS AGO—

CLEVELAND was the site of the fall meeting of the American Welding Society held the last two days of this month.

—30 YEARS AGO—

HOW a modern scrap dock and reclamation plant dismantles 20 steel gondolas per week is described in this issue by C. J. Mackie, storekeeper, Chicago, Burlington and Quincy Railroad, Aurora, Ill.

—30 YEARS AGO—

"PIPE Joint Patterns," which explains how patterns for welded joints save time and money, is the title of an article in this issue. Author is E. Miller.

—30 YEARS AGO—

MANAGEMENT of West Gate Welding & Electric Supply Co., San Francisco, has been taken over by E. R. Chinberg, formerly electrical supervisor of the Chicago, Rock Island & Pacific Railway.

—30 YEARS AGO—

LINDE Air Products Co. plans the construction of a new plant in Houston, Texas.

—30 YEARS AGO—

MOREY Flux & Chemical Co., Inc., is moving its laboratories from Parkesburg, Pa., to 1813 Williamson St., Wilmington, Del.

—30 YEARS AGO—

PROOF of weld strength was provided in this issue by J. F. Irby, who told how a second break in a large punch press did not run through an old weld.

—30 YEARS AGO—

THE use of arc welding in building and repairing ships is described by A. G. Bissell, of Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

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# Are REJECT WELDS killing your profits?

**avoid scrap loss, reworks with DryRod Electrode Oven!**

Engineers say most defects in high-strength welds — X-ray porosity, rough welds, underbead cracking, etc. — are caused by moist electrodes. DryRod — the original shop-tested *circular* electrode oven — safely preserves the manufacturer's "baked-in" quality . . . keeps rods within the .2% moisture limit allowed. Protect yourself against costly rejects, reworks, scrap loss . . . preserve electrodes conveniently, at low cost, with DryRod. Write for free bulletin.

**Type 300 Oven**

*Automatic thermostatic control, 175 to 550° . . . holds 350 lbs. of 18" rods . . . safe, adequate 840-watt heater . . . completely wired for 110/220 or 220/440 volt AC . . . sturdy welded-reinforced sheet metal construction . . . insulated — low heat loss, low upkeep.*

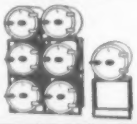
DryRod—Trademark X-DR-13

## Cut costs 4 ways with DryRod Method

**1** Store sealed cartons in warm, dry place.

**2** Place unpackaged electrodes in DryRod Oven and withdraw as needed.

**3** Locate DryRod as close to welding operations as possible.



**4** For flexible, large-volume storage, stack ovens with compact DryRod Stands.

**DryRod** DIVISION OF **Phoenix Products Co.**
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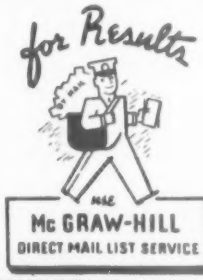


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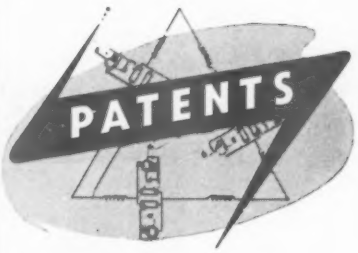
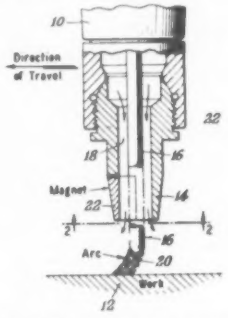



### Inert-gas process

2,666,122. JOHN L. CURTIN, Kenmore, and DONALD M. YENNI, Williamsville, N. Y. Assigned to Union Carbide and Carbon Corp. Filed Oct. 27, 1950. Granted Jan. 12, 1954.




This patent concerns a process for working metal in which a metal-fusing electric arc is established between the work and a metal electrode by current flowing through both. A cup surrounding the electrode discharges a stream of inert gas around the electrode and arc and over the adjacent work metal. The arc is directed with a transversely balanced component of a magnetic field. The metal is fused by progressively moving the electrode and the workpiece along the line to be welded. The strength and direction of the magnetic field component is such that the arc is kept focused on the work at an acute angle, whereby the speed of operation is substantially increased.

* * *

### Welding transformer

2,671,196. FREDERICK C. OWEN, Fayetteville, N. C. Filed June 24, 1948. Granted March 2, 1954.

This patent concerns an a-c arc welder that has primary and secondary windings on the center leg of a shell-type core. Part of the secondary windings are axially spaced from the primary ones. Magnetic inserts are so dimensioned as to span the distances between center and side legs of the core. These inserts are movable into and out of positions between the spaced windings on the center leg. Included is a resonant circuit that is reactive on the windings. The resonant frequency of this circuit depends on the setting of the inserts.

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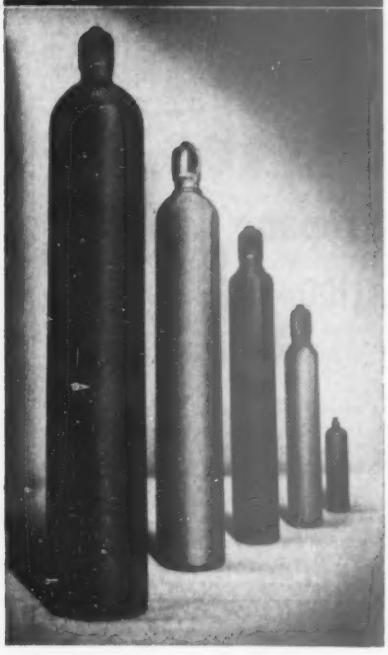

It stands to reason: there is no substitute for experience. *Harrisburg Steel* is the pioneer and world's largest manufacturer of high-pressure gas cylinders made to I.C.C. specifications. And for decades, *Harrisburg Steel* has built reliable cylinders for all branches of the Welding industry . . . cylinders possessing extra margins of *quality* and *safety* . . . cylinders that perform better and last longer. Capacities range from 14 to 400 cubic feet . . . they are manufactured in both Domestic and Export types. The next time you order oxygen gas cylinders, may we suggest that you entrust your order to *Harrisburg Steel*. Meanwhile, write for catalog and current prices.

HSC-W-1/54

101 Years in Pennsylvania's Capital
Harrisburg Steel
CORPORATION HARRISBURG 18 PENNSYLVANIA


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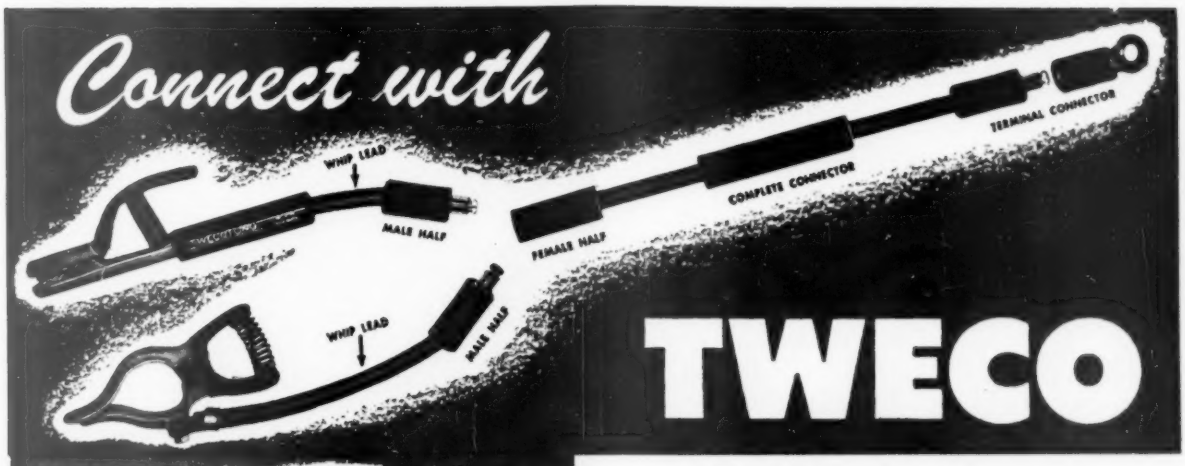
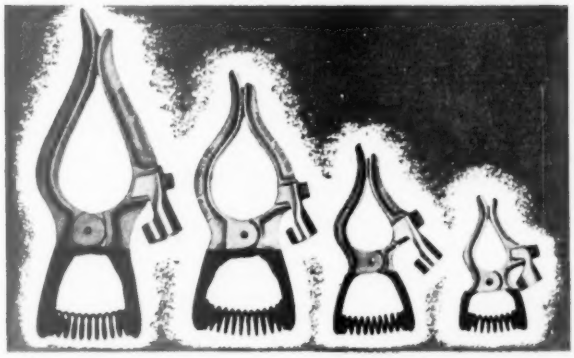


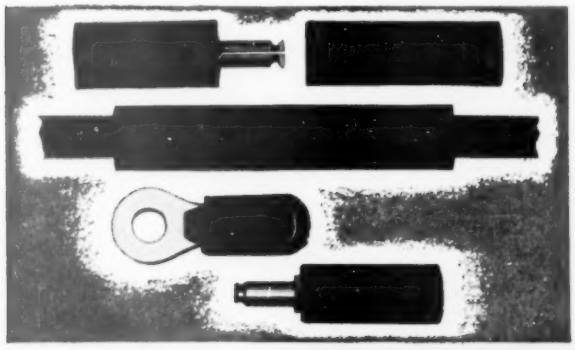
## ELECTRODE HOLDERS

TWECOTONG Electrode Holders cost less to buy, less to maintain. Supplied in a full range of Rod-Rated sizes to handle electrodes from 1/16" through 3/8". They feature "Super-Mel" laminated glass cloth insulation; it won't break, it won't burn, it won't turn to carbon and carry current. All parts are replaceable and many are interchangeable. It will pay you to standardize on TWECOTONG.



## GROUND CLAMPS

TWECO, the original arc welding ground clamp, provides a quick, positive and portable connection to the work. It helps to eliminate arc blow, slides on and off the work easily yet provides a firm bite. Positive grounding permits lower machine settings and increases arc stability. Made from high copper alloy in graduated sizes from 125 through 500 Amperes for every arc welding application.



## CABLE CONNECTORS
## TERMINAL CONNECTORS

Provide new convenience and flexibility to the cable "pipe lines" of welding. Permit easy Jump-in of additional lengths of cable, and salvage of odd lengths of cable. Widely used for attaching Holder Whip Cables. Male connector plug also fits female Terminal receptacle. Terminals provide a quick and sound connection at the machine yet permit a quick cable switch for reversing polarity. Cable easily removed for maintenance or shipping. Full interchangeability.

SEE YOUR LOCAL WELDING SUPPLY DISTRIBUTOR

WRITE FOR TWECOLOG
*Data and prices on the complete TWECO line of electrode holders, ground clamps and cable connections.*

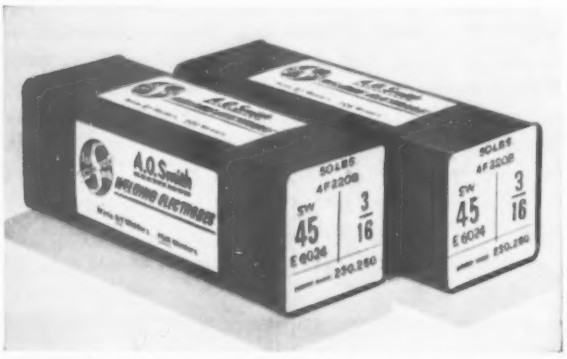
Tweco PRODUCTS COMPANY

# Yes! Slag peels as you weld!

Unretouched photo proves SW-44's fine ripples, good wash-up and complete absence of undercut.

## New A. O. Smith SW-44 iron powder electrode offers outstanding speed, bead appearance

**THROUGH RESEARCH . . . A BETTER WAY.** Once again the A. O. Smith laboratories have advanced the ease and speed of welding. This time it's the SW-44 — a *perfected* iron powder electrode that's practically *self-cleaning.*




For AWS Class E-6020 work, A. O. Smith offers the job-proved SW-45 heavy-coated iron powder electrode. Here are high physicals and consistent x-ray quality plus fast deposition, good bead appearance, ease of cleaning. Like the SW-44, it's the high-speed answer for horizontal and down-hand fillet and groove welding.

Not only can you deposit far more E-6012 type of weld metal than with conventional electrodes — you *almost eliminate the job of cleaning.* What's more, bead appearance is outstanding — flawlessly smooth with fine ripples. It's as easy as squeezing tooth paste out of a tube. And re-striking is easy . . . even with a completely cooled rod.

If you haven't tried the new SW-44, see your A. O. Smith distributor today. Or you can get all the facts from A. O. Smith Corp., Milwaukee 1, Wisconsin.

*Through research* A.O.Smith *. . . a better way*

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